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SIMATIC Ident

RFID Systems

SIMATIC RF200

Sytem Manual

Ausgabe 09/2013

Answers for industry.

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SIMATIC Ident

RFID systems SIMATIC RF200

System Manual

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Appendix A

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1 Introduction

Introduction

SIMATIC RF200 is a compact RFID system in the SIMATIC RF product family. The product range comprises cost-efficient RF readers that are ideal for use in small assembly lines or in intralogistics. SIMATIC RF200 RFID readers only support the RFID standard ISO 15693 and are therefore ideal for operation with the extensive range of MOBY D transponders.

All readers of the RF200 product family are available with an RS-422 interface and 3964R transmission protocol (6GT2821-xAC10). These readers are designed for operation in conjunction with communications modules. To operate with third-party controllers (without communications modules), RF200 reader variants are available with an RS-232 interface (RF240R/RF250R/RF260R/RF290R). Depending on the reader type and order number, communication is with the 3964R transmission protocol or with simple ASCII communication.

Readers with an internal antenna have a particularly compact design (RF210R/RF220R/RF240R/RF260R). RF250R and RF290R are designed for operation with external antennas either to achieve longer distances or larger field sizes (RF290R with ANT D5/D6/D10) or to allow installation where there is very little space (RF250R with ANT 8/12/18/30).

Scope of validity of this document

This documentation is valid for all variants of the SIMATIC RF200 system and describes the devices shipped as of September 2013.

Registered trademarks

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Further information

You will find more detailed information in MOBY D System Manual (http://support.automation.siemens.com/WW/view/en/13628689/0/en), Function Manual FB 45 (http://support.automation.siemens.com/WW/view/en/21738808) or in RF300 system manual (http://support.automation.siemens.com/WW/view/en/21738946).

History

The following issues of the SIMATIC RF200 system manual have been published:

Output	Note
03/2011	First edition
05/2011	Expansion of the documentation with the addition of the device variant RF260R with RS-232 interface
09/2011	Expansion of the documentation with the device variant RF240R
03/2013	Expansion of the documentation with the device variant RF290R
09/2013	Expansion of the documentation by the following: • the device variant RF250R • the device variants RF240R and RF260R with ASCII interface • Antennas ANT 8, ANT 12, ANT 18 and ANT 30 • Transponders

Safety notes

2

SIMATIC RFID products comply with the salient safety specifications to IEC, VDE, EN, UL and CSA. If you have questions about the validity of the installation in the planned environment, please contact your service representative.

NOTICE
Alterations to the devices are not permitted. Failure to observe this requirement shall constitute a revocation of the radio equipment approval, CE approval and manufacturer's warranty.

Repairs

Repairs may only be carried out by authorized qualified personnel.

⚠ WARNING
Unauthorized opening of and improper repairs to the device may result in substantial damage to equipment or risk of personal injury to the user.

System expansion

Only install system expansion devices designed for this device. If you install other upgrades, you may damage the system or violate the safety requirements and regulations for radio frequency interference suppression. Contact your technical support team or your sales outlet to find out which system upgrades are suitable for installation.

NOTICE
If you cause system defects by installing or exchanging system expansion devices, the warranty becomes void.

System overview

3

SIMATIC RF200 is an inductive identification system that is compatible with the ISO 15693 standard and was specially designed for use in industrial production for the control and optimization of material flows.

In contrast to SIMATIC RF300, SIMATIC RF200 is intended for RFID applications where performance requirements are not very high, for example with regard to data volume, transfer rate or diagnostics options. SIMATIC RF200 is characterized by particularly favorable prices.

3.1 RFID components and their function

RF200 system components

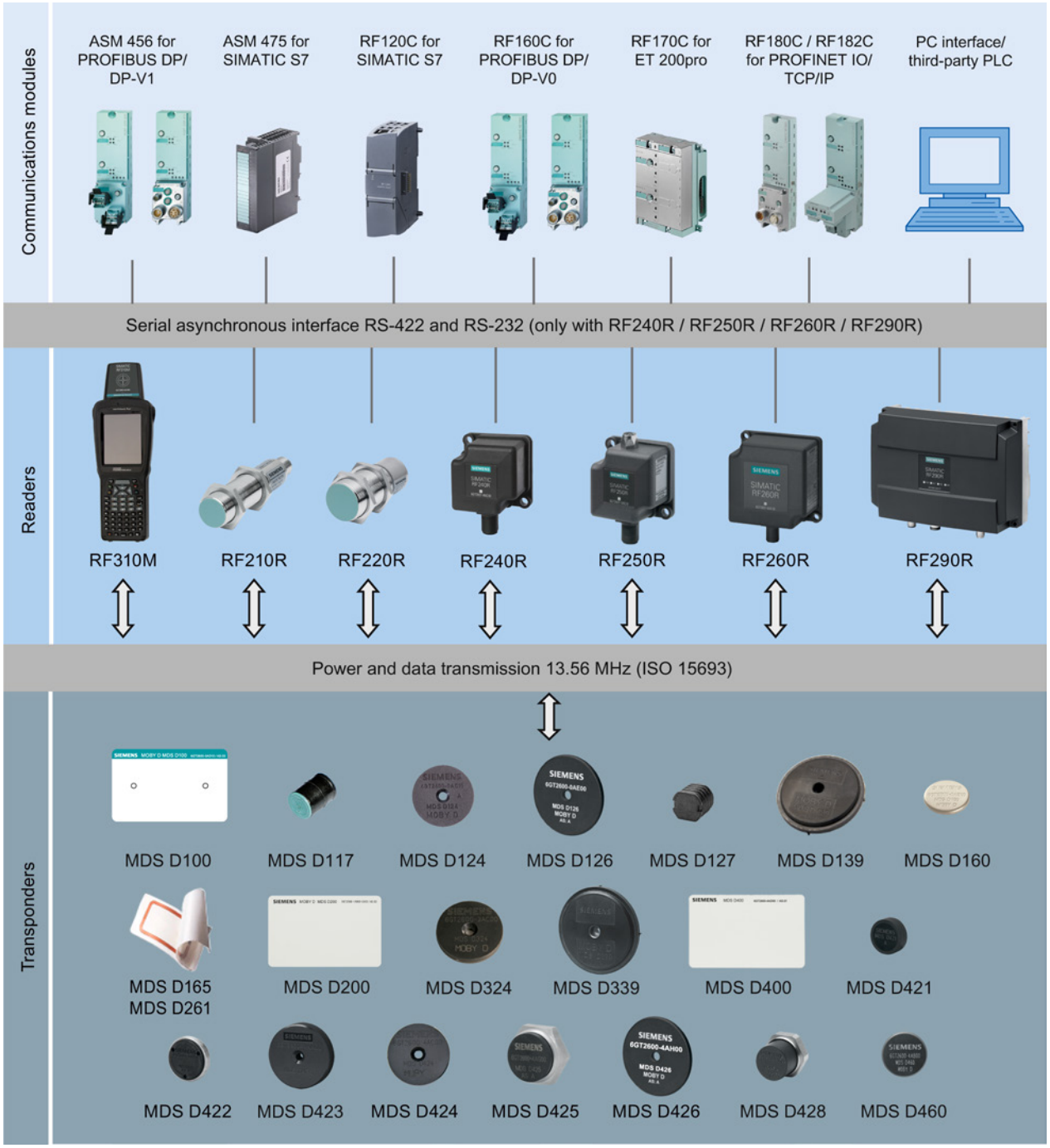


Figure 3-1 RF200 system overview

Table 3- 1 Possible reader-transponder combinations

Transponder	RF210R	RF220R	RF240R	RF250R with ANT 8	RF250R with ANT 12	RF250R with ANT 18	RF250R with ANT 30	RF260R	RF290R [3]	RF310M
MDS D100	--	○	✓	--	--	--	○	✓	✓	✓
MDS D117	○	--	--	✓	✓	--	--	--	--	✓ [5]
MDS D124	✓	✓	✓	--	--	✓	✓	✓	✓	✓
MDS D126	--	✓	✓	--	--	--	✓	✓	✓	✓
MDS D127	✓	--	--	✓	✓	--	--	--	--	✓ [5]
MDS D139 [1]	--	○	○	--	--	--	○	✓	✓	✓
MDS D160 [2]	✓	✓	✓	--	✓	✓	✓	✓	✓	✓
MDS D165	--	○	✓	--	--	--	○	✓	✓	✓
MDS D200	--	○	✓	--	--	--	○	✓	✓	✓
MDS D261	--	○	✓	--	--	--	○	✓	✓	✓
MDS D324	✓	✓	✓	--	○	✓	✓	✓	✓	✓
MDS D339	--	○	○	--	--	--	○	✓	✓	✓
MDS D400	--	--	✓	--	--	--	○	✓	✓	✓
MDS D421	✓	○	--	✓	✓	✓	--	--	--	✓ [5]
MDS D422	✓	✓	✓	--	✓	✓	✓	--	--	✓ [5]
MDS D423	✓	✓	✓	--	--	✓	✓	✓	--	✓
MDS D424	✓	✓	✓	--	--	✓	✓	✓	✓	✓
MDS D425	✓	✓	✓	--	✓	✓	✓	--	--	✓
MDS D426	--	✓	✓	--	--	--	✓	✓	✓	✓
MDS D428	✓	✓	✓	--	✓	✓	✓	✓	--	✓
MDS D460	✓	✓	✓	--	✓	✓	✓	✓	○ / ✓ [4]	✓

[1] Only with the order number 6GT2600-0AA10

[2] Only with the order number 6GT2600-0AB10

[3] in conjunction with ANT D5, D6 or D10

[4] Combination recommended only in conjunction with ANT D5.

[5] only in conjunction with RF310M for external antennas (6GT2803-1AC10)

✓ Combination possible

-- Combination not possible

○ Combination possible, but not recommended

For more detailed information about the SIMATIC RF310M mobile reader, please refer to the "SIMATIC RF310M Operating Instructions (http://support.automation.siemens.com/WW/view/en/51812642)".

3.2 Overview of transponders

Overview of typical areas of application of ISO transponders for RF200

Transponder	Area of application
MDS D100	From simple identification such as electronic barcode replacement or supplementation, through warehouse and distribution logistics, right up to product identification. With this transponder, the maximum ranges are achieved in combination with the SIMATIC RF260R reader.
MDS D117	Very compact data carrier that can be cemented into areas where precise positioning is necessary. e.g. tool identification.
MDS D124	Application areas in factory automation (e.g. small paintshops to 180°C).
MDS D126	Compact and rugged ISO transponder; suitable for identification of transport units in production-related logistics; can also be deployed in harsh conditions.
MDS D127	Very compact data carrier that can be screwed into areas where precise positioning is necessary. e.g. tool identification.
MDS D139 [1)]	Applications in production automation with high temperature demands (up to +220 °C). Typical application areas: • Paintshops and their preparatory treatments • Primer coat, electrolytic dip area, cataphoresis with the associated drying furnaces • Top coat area with drying furnaces • Washing areas at temperatures > 85 °C • Other applications with higher temperatures
MDS D160 [2)]	Typical applications are, for example: • Rented work clothing • Hotel laundry • Surgical textiles • Hospital clothing • Dirt collection mats • Clothing for nursing homes/hostels • Assembly lines with very small workpiece holders
MDS D165	Smart label (self-adhesive label) From simple identification such as electronic barcode replacement/supplementation, through warehouse and distribution logistics, right up to product identification
MDS D200	From simple identification such as electronic barcode replacement/supplementation, through warehouse and distribution logistics, right up to product identification.
MDS D261	Smart label (self-adhesive label) The design of the transponder (self-adhesive label) permits a variety of designs in order to ensure optimum dimensioning for the widest variety of applications. From simple identification such as electronic barcode replacement/supplementation, through warehouse and distribution logistics, right up to product identification.
MDS D324	Production and distribution logistics as well as in assembly and production lines
MDS D339	Applications in production automation with high temperature demands (up to +220 °C). For typical areas of application, see "MDS D139".

Transponder	Area of application
MDS D400	Simple identification such as electronic barcode replacement/supplements, from warehouse and distribution logistics right through to product identification.
MDS D421	The MDS D421 is designed for tool coding according to DIN 69873. It can be used wherever small data carriers and exact positioning are required, e.g. tool identification, workpiece holders
MDS D422	Identification of metallic workpiece holders, workpieces or containers
MDS D423	Identification of metallic workpiece holders, workpieces or containers, production automation
MDS D424	Production and distribution logistics as well as in assembly and production lines
MDS D425	Compact and rugged ISO transponder; suitable for screw mounting. Use in assembly and production lines in the powertrain sector; ideal for mounting on motors, gearboxes, and workpiece holders
MDS D426	Compact and rugged ISO transponder; suitable for identification of transport units in production-related logistics; can also be deployed in harsh conditions
MDS D428	Compact and rugged ISO transponder; suitable for screw mounting Use in assembly and production lines in the powertrain sector
MDS D460	Assembly lines with very small workpiece holders

1) Only with the MLFB 6GT2600-0AA10

2) Only with the MLFB 6GT2600-0AB10

Overview of the memory sizes of the ISO transponders for RF200

Transponder	Memory size
MDS D1xx	112 bytes of EEPROM
MDS D2xx	256 bytes of EEPROM
MDS D3xx	992 bytes of EEPROM
MDS D4xx	2000 bytes FRAM

See also

MOBY D System Manual
(http://support.automation.siemens.com/WW/view/en/13628689/0/en)

RF200 system planning

4

4.1 Fundamentals of application planning

4.1.1 Selection criteria for SIMATIC RF200 components

Assess your application according to the following criteria, in order to choose the right SIMATIC RF200 components:

- Static or dynamic data transfer
- Data volume to be transferred
- Speed in case of dynamic transfer
- Ambient conditions such as relative humidity, temperature, chemical impacts, etc.

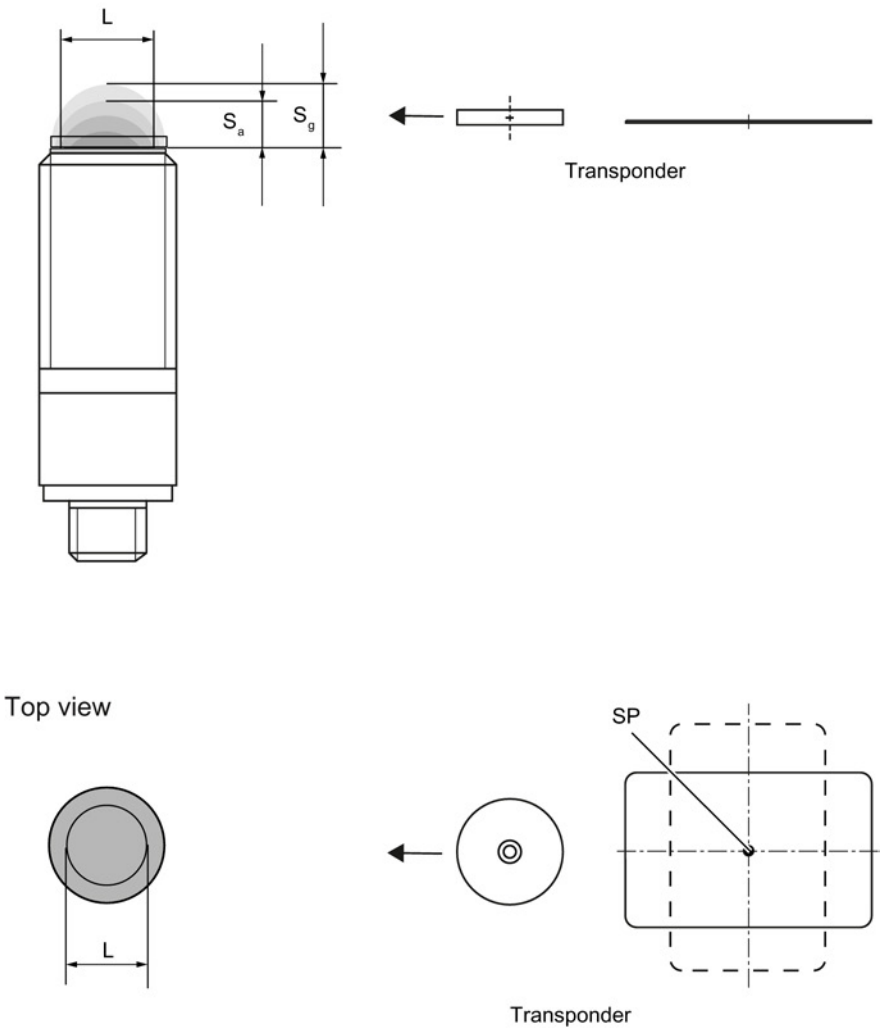
4.1.2 Transmission window and read/write distance

The reader generates an inductive alternating field. The field is strongest close to the reader; however, a read/write distance of "zero" between reader and transponder is not recommended.

The strength of the field decreases in proportion to the distance from the reader. The distribution of the field depends on the structure and geometry of the antennas in the reader and transponder

A prerequisite for the function of the transponder is a minimum field strength at the transponder, which is still barely achieved at distance S_g from the reader.

The picture below shows the transmission window of the SIMATIC RF210R and SIMATIC RF220R readers between transponder and reader:



S_a Operating distance between transponder and reader

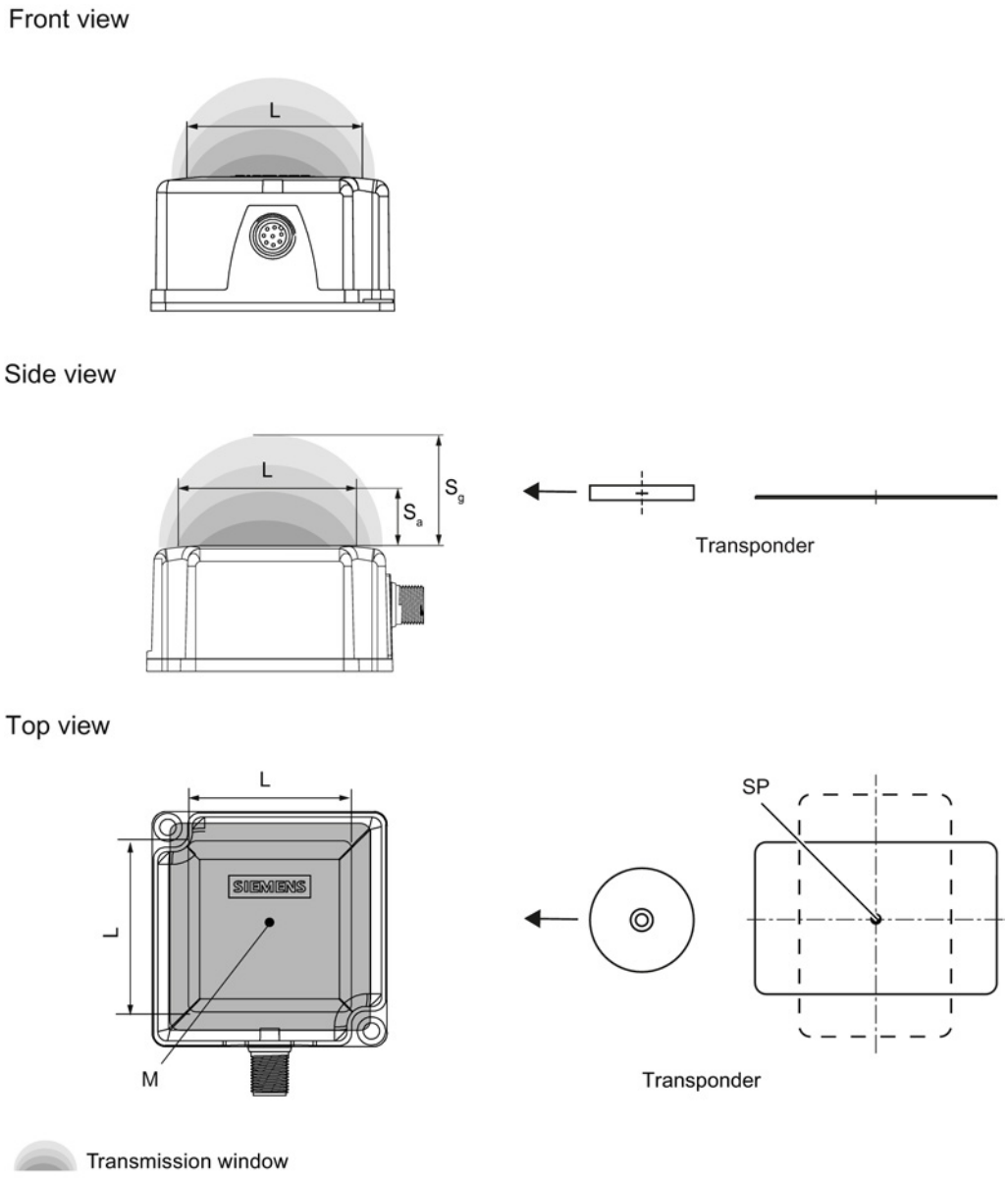
S_g Limit distance (maximum clear distance between upper surface of the reader and the transponder, at which the transmission can still function under normal conditions)

L Diameter of a transmission window

SP Intersection of the axes of symmetry of the transponder

Figure 4-1 RF210R/RF220R transmission window

The figure below shows the transmission window of the SIMATIC RF240R and SIMATIC RF260R readers between transponder and reader:



S_a Operating distance between transponder and reader

S_g Limit distance (maximum clear distance between upper surface of the reader and the transponder, at which the transmission can still function under normal conditions)

L Length of a transmission window

M Field centerpoint

Figure 4-2 RF240R/RF260R transmission window

The transponder can be used as soon as the intersection (SP) of the transponder enters the area of the transmission window.

From the diagrams above, it can also be seen that operation is possible within the area between S_a and S_g. The active operating area reduces as the distance increases, and shrinks to a single point at distance S_g. Only static mode should thus be used in the area between S_a and S_g.

4.1.3 Width of the transmission window

Determining the width of the transmission window

The following approximation formula can be used for practical applications:

$$B = 0.4 \cdot L$$

B: Width of the transmission window
L: Length of the transmission window

Tracking tolerances

The width of the transmission window (B) is particularly important for the mechanical tracking tolerance. The formula for the dwell time is valid without restriction when B is observed.

4.1.4 Permissible directions of motion of the transponder

Detection area and direction of motion of the transponder

The transponder and reader have no polarization axis, i.e. the transponder can come in from any direction, assume any position as parallel as possible to the reader, and cross the transmission window. The figure below shows the active area for various directions of transponder motion:

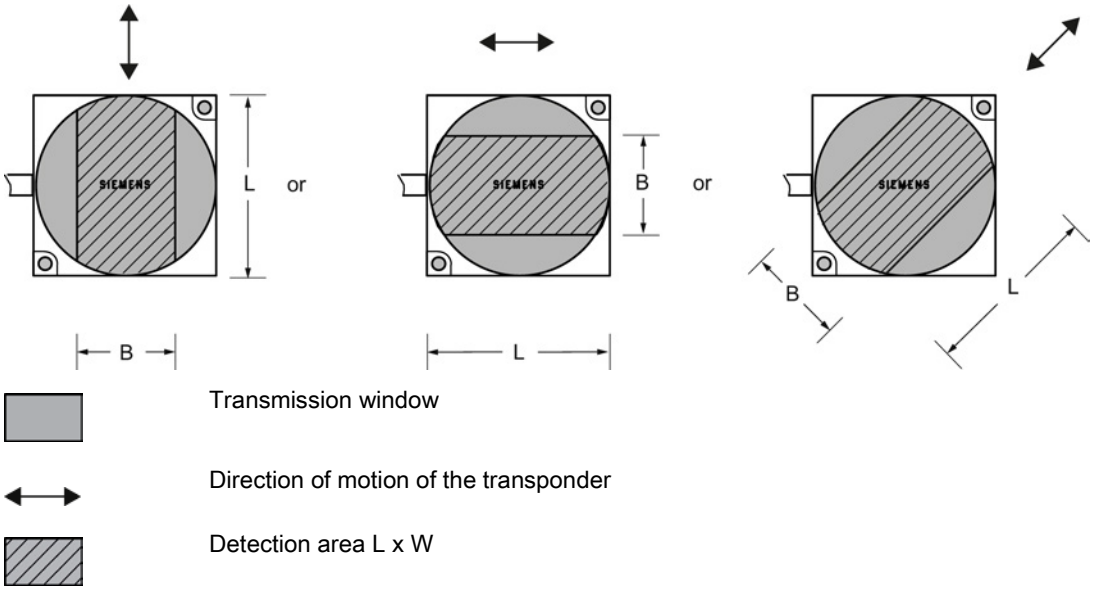


Figure 4-3 Detection areas of the reader for different directions of transponder motion

4.1.5 Operation in static and dynamic mode

Operation in static mode

If working in static mode, the transponder can be operated up to the limit distance (S_g). The transponder must then be positioned exactly over the reader:

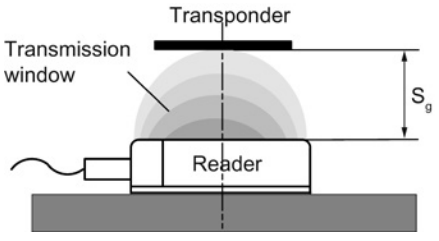


Figure 4-4 Operation in static mode

Note

Note that in a metallic environment the values for the limit distance are reduced.

Operation in dynamic mode

When working in dynamic mode, the transponder moves past the reader. The transponder can be used as soon as the intersection (SP) of the transponder enters the circle of the transmission window. In dynamic mode, the operating distance (S_a) is of primary importance. [Operating distances, see Chapter Field data of transponders and readers (Page 35)]

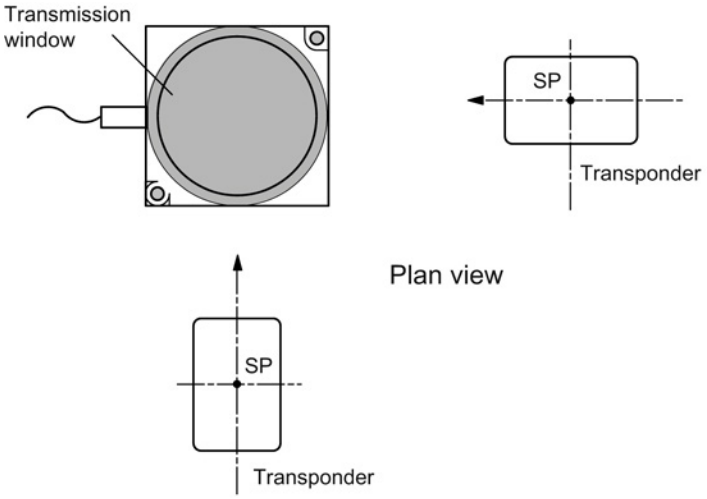


Figure 4-5 Operation in dynamic mode

4.1.6 Dwell time of the transponder

The dwell time is the time in which the transponder remains within the transmission window of a reader. The reader can exchange data with the transponder during this time.

The dwell time is calculated thus:

$$t_v = \frac{L \cdot 0{,}8\,[m]}{v_{Tag}\,[m/s]}$$

t_V: Dwell time of the transponder

L: Length of the transmission window

v_{Tag}: Speed of the transponder (tag) in dynamic mode

0,8: Constant factor used to compensate for temperature impacts and production tolerances

The dwell time can be of any duration in static mode. The dwell time must be sufficiently long to allow communication with the transponder.

The dwell time is defined by the system environment in dynamic mode. The volume of data to be transferred must be matched to the dwell time or vice versa. In general:

$$t_V \geq t_K$$

$t_{V:}$: Dwell time of the data memory within the field of the reader

t_K: Communication time between transponder and communication module

4.1.7 Communication between communication module, reader and transponder

Communication between the communication module, reader and transponder takes place asynchronously through the RS422 interface. Depending on the communication module (ASM) used, transfer rates of 19200 baud, 57600 baud or 115200 baud can be selected.

Calculation of the communication time for interference-free transfer

The communication time for fault-free data transfer is calculated as follows:

$$t_K = K + t_{Byte} \cdot n \qquad (n \geq 1)$$

If the transmission is interrupted briefly due to external interference, the reader automatically continues the command.

Calculation of the maximum amount of user data

The maximum amount of user data is calculated as follows:

$$n_{max} = \frac{t_V - K}{t_{Byte}}$$

t_k: Communication time between communication module, reader and transponder

t_v: Dwell time

n: Amount of user data in bytes

n_{max}: Max. amount of user data in bytes in dynamic mode

t_{byte}: Transmission time for 1 byte

K: Constant; the constant is an internal system time. This contains the time for power buildup on the transponder and for command transfer

Time constants K and t_{byte}

Table 4- 1 Typical communication time on the serial interface when operating with presence check

Transfer rate [baud]	Read		Write					
	All MDS		MDS D1xx/D3xx		MDS D2xx		MDS D4xx	
	K [ms]	t_{byte} [ms]	K [ms]	t_{byte} [ms]	K [ms]	t_{byte} [ms]	K [ms]	t_{byte} [ms]
19200	35	1.08	41	2.66	50	8.1	35	1.08
57600	34	0.59	28	2.28	33	7.7	34	0.59
115200	26	0.56	26	2.17	31	7.6	26	0.56

Table 4- 2 Typical command duration on the air interface for operation without presence check

TAG type	Command	K [ms]	T_{byte} [ms]
All MDS	Read	20	0.55
EEPROM (MDS D1xx/D3xx)	Write	27	2.2
EEPROM (MDS D2xx)	Write	19	7.5
FRAM (MDS D4xx)	Write	27	0.55

In dynamic mode, the values for K and t_{byte} are independent of the transmission speed. The communication time only includes the processing time between the reader and the transponder and the internal system processing time of these components. The communication times between the communication module and the reader do not have to be taken into account because the command for reading or writing is already active when the transponder enters the transmission field of the reader.

The values shown above must be used when calculating the maximum quantity of user data in dynamic mode. They are applicable for both writing and reading.

Calculation tool

User-friendly calculation tools are available for the communications modules ASM 456, RF160C, RF170C and RF180C to calculate data transfer times. The calculation tools can be found on the DVD "RFID Systems Software & Documentation", order number 6GT2080-2AA20.

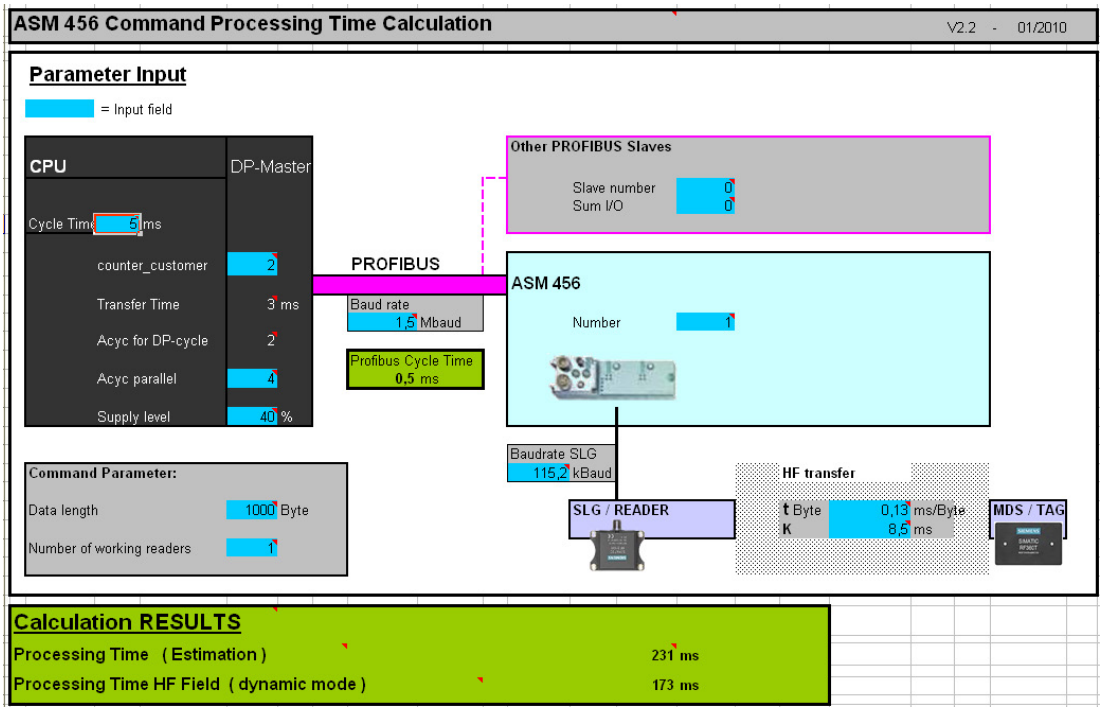


Figure 4-6 Calculation tool interface

4.1.8 Impact of secondary fields

Secondary fields in the range from 0 mm to 30% of the limit distance (S_g) generally always exist.
They should only be used during configuration in exceptional cases, however, since the read/write distances are very limited. Exact details of the secondary field geometry cannot be given, since these values depend heavily on the operating distance and the application.
When working in dynamic mode, remember that during the transition from the secondary field to the main field the presence of the tag is lost temporarily. It is therefore advisable to select a distance > 30% of S_g.

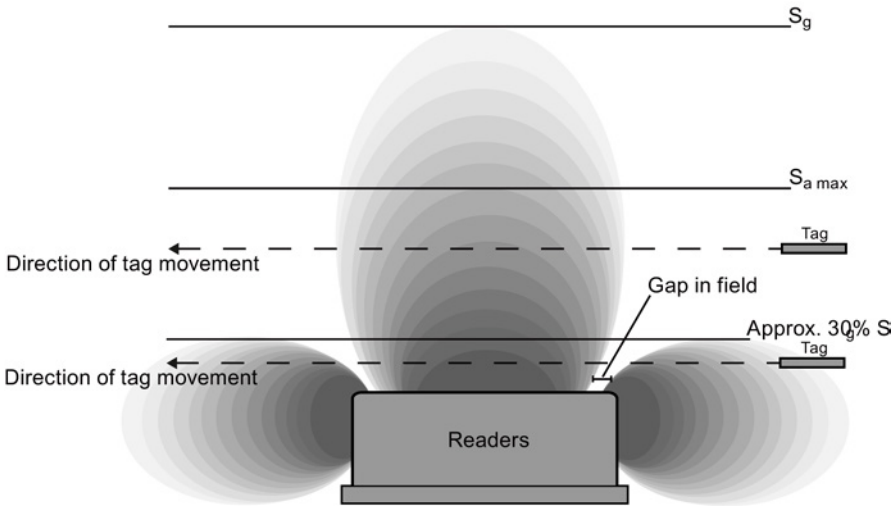


Figure 4-7 Gap in the field resulting from secondary fields

Secondary fields without shielding

The following graphic shows typical primary and secondary fields, if no shielding measures are taken.

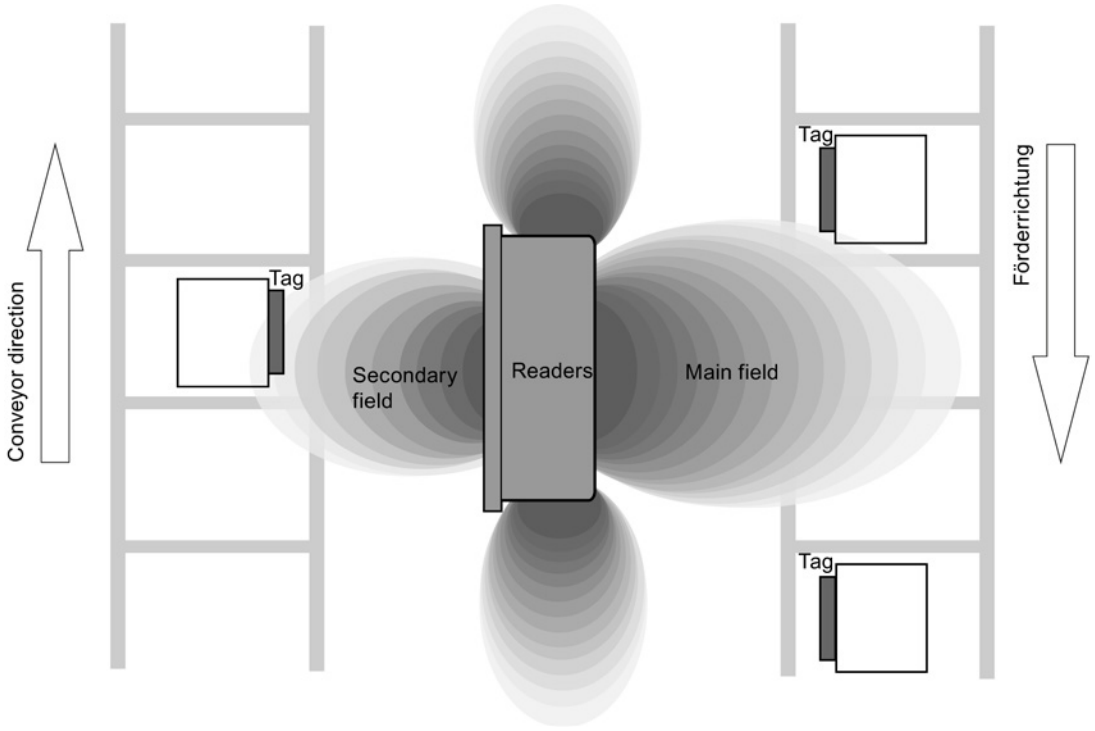


Figure 4-8 Secondary field without shielding

In this arrangement, the reader can also read tags via the secondary field. Shielding is required in order to prevent unwanted reading via the secondary field, as shown and described in the following.

Secondary fields with shielding

The following graphic shows typical primary and secondary fields, with metal shielding this time.

The metal shielding prevents the reader from detecting tags via the secondary field.

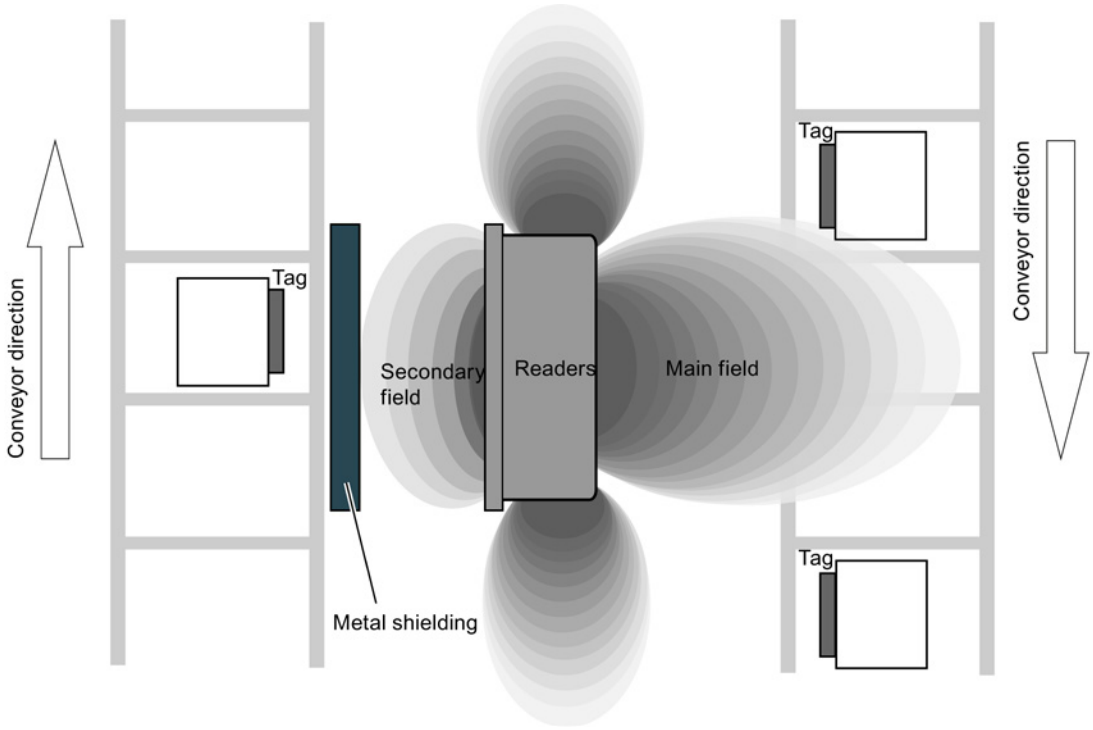


Figure 4-9 Secondary field with shielding

4.2 Field data of transponders and readers

4.2.1 Field data

The limit distances (S_g) and operating distances (S_a) along with the length of the transmission window for each reader-transponder combination are listed in the tables below.

Table 4- 3 SIMATIC RF210R field data

	Length of the transmission window (L)	Operating distance (S_a)	Limit distance (S_g)
MDS D124	25	1 ... 18	20
MDS D127 [1)]	5	0 ... 2	2
MDS D160	20	1 ... 10	12
MDS D324	20	1 ... 8	9
MDS D421	5	0 ... 3	4
MDS D422	8	1 ... 9	10
MDS D423	20	2 ... 10	12
MDS D424	24	1 ... 16	18
MDS D425	12	1 ... 6	7
MDS D428	20	1 ... 10	11
MDS D460	8	1 … 8	9

[1)] The transponder is only suitable for static mode.

All dimensions in mm.

Table 4- 4 SIMATIC RF220R field data

	Length of the transmission window (L)	Operating distance (S_a)	Limit distance (S_g)
MDS D124	35	1 ... 28	31
MDS D126	45	2 ... 30	35
MDS D160	20	1 ... 20	22
MDS D324	30	2 ... 21	25
MDS D422	18	1 ... 12	14
MDS D423	30	2 ...24	28
MDS D424	30	2 ... 25	29
MDS D425	20	1 ... 11	13
MDS D426	40	2 ... 25	30
MDS D428	25	1 ... 18	21
MDS D460	25	1 ... 18	20

All dimensions in mm.

Table 4- 5 SIMATIC RF240R field data

	Length of the transmission window (L)	Operating distance (S_a)	Limit distance (S_g)
MDS D100	100	2 ... 84	95
MDS D124	65	2 ... 53	60
MDS D126	80	2 ... 57	65
MDS D160	50	1 ... 33	37
MDS D165	105	2 ... 80	94
MDS D200	90	2 ... 69	78
MDS D261	70	2 ... 60	70
MDS D324	55	1 ... 36	40
MDS D400	95	2 ... 80	90
MDS D422	25	1 ... 12	15
MDS D423	40	2 ... 35	40
MDS D424	75	1 ... 47	53
MDS D425	30	1 ... 15	17
MDS D426	65	2 ... 45	55
MDS D428	50	1 ... 30	34
MDS D460	50	1 ... 30	34

All dimensions in mm.

Table 4- 6 Field data SIMATIC RF250R, with ANT 8

	Length of the transmission window (L)	Operating distance (S_a)	Limit distance (S_g)
MDS D117	2	0 ... 2	3
MDS D127	3	0 ... 3	4
MDS D421	3	0 ... 3	4

All dimensions in mm.

Table 4- 7 Field data SIMATIC RF250R, with ANT 12

	Length of the transmission window (L)	Operating distance (S_a)	Limit distance (S_g)
MDS D117	3	0 ... 3	4
MDS D127	4	0 ... 4	5
MDS D160	18	0 ... 12	17
MDS D421	10	0 ... 3	5
MDS D422	22	0 ... 7	10
MDS D425	12	0 ... 8	10

	Length of the transmission window (L)	Operating distance (S_a)	Limit distance (S_g)
MDS D428	18	1 ... 10	15
MDS D460	16	1 ... 10	14

All dimensions in mm.

Table 4- 8 Field data SIMATIC RF250R, with ANT 18

	Length of the transmission window (L)	Operating distance (S_a)	Limit distance (S_g)
MDS D124	26	2 ... 24	37
MDS D160	22	1 ... 18	26
MDS D324	30	1 ... 18	27
MDS D421	16	0 ... 3	4
MDS D422	24	1 ... 8	14
MDS D423	21	1 ... 15	18
MDS D424	26	1 ... 27	36
MDS D425	19	1 ... 11	16
MDS D428	19	1 ... 8	15
MDS D460	19	1 ... 17	21

All dimensions in mm.

Table 4- 9 Field data SIMATIC RF250R, with ANT 30

	Length of the transmission window (L)	Operating distance (S_a)	Limit distance (S_g)
MDS D124	40	1 ... 35	48
MDS D126	65	0 ... 47	60
MDS D160	24	1 ... 23	30
MDS D324	32	1 ... 22	35
MDS D422	27	0 ... 12	15
MDS D423	30	2 ... 18	26
MDS D424	37	0 ... 34	48
MDS D425	22	1 ... 12	20
MDS D426	65	0 ... 44	58
MDS D428	30	1 ... 20	32
MDS D460	24	1 ... 21	27

All dimensions in mm.

Table 4- 10 SIMATIC RF260R field data

	Length of the transmission window (L)	Operating distance (S_a)	Limit distance (S_g)
MDS D100	120	2 ... 110	130
MDS D124	80	2 ... 80	85
MDS D126	110	2 ... 75	100
MDS D139	120	2 ... 80	110
MDS D160	60	2 ... 40	45
MDS D165	120	2 ... 120	135
MDS D200	120	2 ... 100	120
MDS D261	80	2 ... 75	90
MDS D324	80	2 ... 60	70
MDS D339	110	2 ... 65	80
MDS D400	140	2 ... 110	140
MDS D423	55	2 ... 40	45
MDS D424	80	2 ... 60	70
MDS D426	75	2 ... 70	85
MDS D428	50	2 ... 40	45
MDS D460	50	2 ... 40	45

All dimensions in mm.

Table 4- 11 Filed data SIMATIC RF290R, with ANT D5

	Length of the transmission window (L)	Operating distance (S_a)	Limit distance (S_g)
MDS D100	320	0 ... 400	500
MDS D124	300	0 ... 200	280
MDS D126	320	0 ... 350	400
MDS D139	320	0 ... 400	500
MDS D160	300	0 ... 130	180
MDS D165	320	0 ... 350	450
MDS D200	320	0 ... 400	500
MDS D261	320	0 ... 300	400
MDS D324	300	0 ... 200	280
MDS D339	320	0 ... 300	380
MDS D400	320	0 ... 400	500
MDS D424	300	0 ... 200	280
MDS D426	320	0 ... 300	350
MDS D460	300	0 ... 120	160

All dimensions in mm.

Table 4- 12 Field data SIMATIC RF290R, with ANT D6

	Length of the transmission window (L)		Operating distance (S_a)	Limit distance (S_g)
	X direction	Y direction		
MDS D100	520	420	0 ... 550	650
MDS D124	500	400	0 ... 220	300
MDS D126	520	420	0 ... 400	500
MDS D139	520	420	0 ... 500	600
MDS D160	500	400	0 ... 130	180
MDS D165	520	420	0 ... 400	500
MDS D200	520	420	0 ... 500	600
MDS D261	520	420	0 ... 350	450
MDS D324	500	400	0 ... 200	280
MDS D339	520	420	0 ... 400	480
MDS D400	520	420	0 ... 500	650
MDS D424	500	400	0 ... 220	300
MDS D426	520	420	0 ... 350	400

All dimensions in mm.

Table 4- 13 Field data SIMATIC RF290R, with ANT D10

	Length of the transmission window (L)		Operating distance (S_a)	Limit distance (S_g)
	X direction	Y direction		
MDS D100	1050	350	0 ... 500	600
MDS D124	1000	300	0 ... 200	280
MDS D126	1050	350	0 ... 400	500
MDS D139	1050	350	0 ... 450	550
MDS D160	1000	300	0 ... 130	180
MDS D165	1050	350	0 ... 350	450
MDS D200	1050	350	0 ... 450	550
MDS D261	1050	350	0 ... 350	450
MDS D324	1000	300	0 ... 200	280
MDS D339	1050	350	0 ... 300	380
MDS D400	1050	350	0 ... 400	500
MDS D424	1000	300	0 ... 200	280
MDS D426	1050	350	0 ... 350	400

All dimensions in mm.

4.2.2 Minimum clearances

Minimum distance from transponder to transponder

The specified distances refer to a metal-free environment. For a metallic environment, the specified minimum distances must be multiplied by a factor of 1.5.

Table 4- 14 Minimum clearances for transponders

	RF210R	RF220R	RF240R	RF260R
MDS D100	-	-	-	≥ 240
MDS D117	≥ 15	-	-	-
MDS D124	≥ 25	≥ 40	≥ 90	≥ 180
MDS D126	-	≥ 50	≥ 100	≥ 180
MDS D127	≥ 15	-	-	-
MDS D139	-	-	-	≥ 200
MDS D160	≥ 20	≥ 25	≥ 70	≥ 150
MDS D165	-	-	-	≥ 240
MDS D200	-	-	-	≥ 240
MDS D261	-	-	-	≥ 200
MDS D324	≥ 25	≥ 40	≥ 90	≥ 180
MDS D339	-	-	-	≥ 200
MDS D400	-	-	-	≥ 240
MDS D421	≥ 10	-	-	-
MDS D422	≥ 15	≥ 20	≥ 50	-
MDS D423	-	-	≥ 80	≥ 160
MDS D424	≥ 25	≥ 40	≥ 90	≥ 180
MDS D425	≥ 20	≥ 25	≥ 75	-
MDS D426	-	≥ 50	≥ 90	≥ 180
MDS D428	≥ 25	≥ 25	≥ 75	≥ 150
MDS D460	≥ 20	≥ 25	≥ 70	≥ 150

All values are in mm, relative to the operating distance (S_a) between reader and transponder, and between transponder edge and transponder edge

Table 4- 15 Minimum clearances for transponders

	RF250R [1]				RF290R [2]		
	ANT 8	ANT 12	ANT 18	ANT 30	ANT D5	ANT D6	ANT D10
MDS D100	-	-	-	-	≥ 1000	≥ 1500	≥ 2000
MDS D117	≥ 30	≥ 50	-	-	-	-	-
MDS D124	-	-	≥ 80	≥ 100	≥ 800	≥ 1200	≥ 1800
MDS D126	-	-	-	≥ 100	≥ 1000	≥ 1500	≥ 2000
MDS D127	≥ 40	≥ 60	-	-	-	-	-
MDS D139	-	-	-	-	≥ 1000	≥ 1500	≥ 2000
MDS D160	-	≥ 60	≥ 80	≥ 100	≥ 800	≥ 1200	≥ 1800
MDS D165	-	-	-	-	≥ 1000	≥ 1500	≥ 2000
MDS D200	-	-	-	-	≥ 1000	≥ 1500	≥ 2000
MDS D261	-	-	-	-	≥ 1000	≥ 1500	≥ 2000
MDS D324	-	-	≥ 80	≥ 100	≥ 800	≥ 1200	≥ 1800
MDS D339	-	-	-	-	≥ 1000	≥ 1500	≥ 2000
MDS D400	-	-	-	-	≥ 1000	≥ 1500	≥ 2000
MDS D421	≥ 30	≥ 40	≥ 50	-	-	-	-
MDS D422	-	≥ 50	≥ 60	≥ 70	-	-	-
MDS D423	-	-	≥ 80	≥ 100	-	-	-
MDS D424	-	-	≥ 80	≥ 100	≥ 800	≥ 1200	≥ 1800
MDS D425	-	≥ 50	≥ 60	≥ 80	-	-	-
MDS D426	-	-	-	≥ 100	≥ 800	≥ 1200	≥ 1800
MDS D428	-	≥ 50	≥ 60	≥ 80	-	-	-
MDS D460	-	≥ 60	≥ 80	≥ 100	≥ 800	-	-

[1] Depends on the connected antenna (ANT 8, 12, 18 or 30).

[2] Depends on the connected antenna (ANT D5, D6 or D10).

All values are in mm, relative to the operating distance (S_a) between reader and transponder, and between transponder edge and transponder edge

Minimum distance from reader to reader

Table 4- 16 Minimum distances to readers or antennas

RF210R to RF210R	RF220R to RF220R	RF240R to RF240R	ANT x to ANT x with RF250R	RF260R to RF260R	ANT Dx to ANT Dx with RF290R
≥ 60 mm	≥ 100 mm	≥ 120 mm	ANT 8: ≥ 50 mm	≥ 150 mm	ANT D5: ≥ 2000 mm
			ANT 12: ≥ 60 mm		ANT D6: ≥ 2000 mm
			ANT 18: ≥ 80 mm		ANT D10: ≥ 2000 mm
			ANT 30: ≥ 100 mm		

All values are in mm

Note

Effect on inductive fields by not maintaining the minimum distances of the readers

If the values fall below those specified in the "Minimum distance from reader to reader" table, there is a risk of the function being affected by inductive fields. In this case, the data transfer time would increase unpredictably or a command would be aborted with an error.

Adherence to the values specified in the "Minimum distance from reader to reader" table is therefore essential.

If the specified minimum distance cannot be complied with due to the physical configuration, the SET-ANT command can be used to activate and deactivate the HF field of the reader. The application software must be used to ensure that only one reader is active (antenna is switched on) at a time.

4.3 Installation guidelines

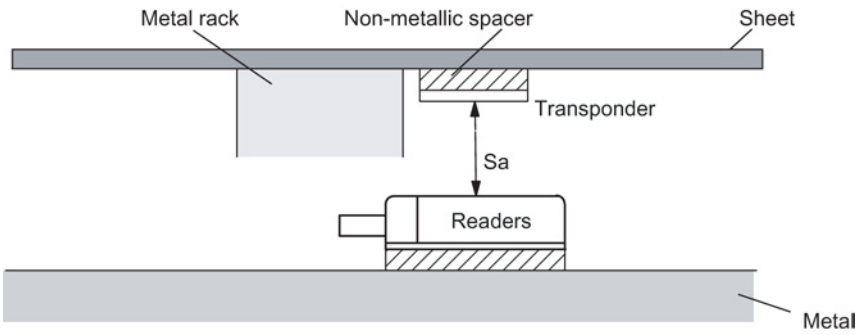
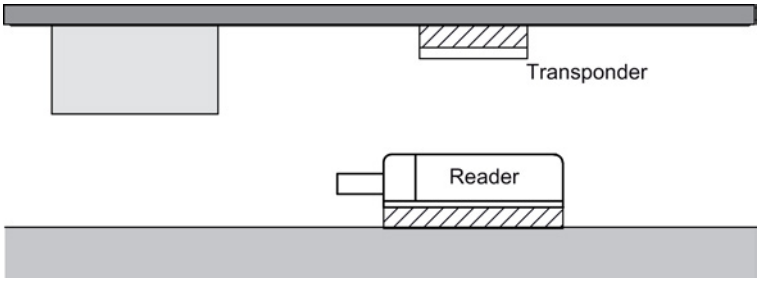
4.3.1 Overview

The transponder and reader complete with their antennas are inductive devices. Any type of metal in the vicinity of these devices affects their functionality. Some points need to be considered during planning and installation if the values described in the "Field data (Page 35)" section are to retain their validity:

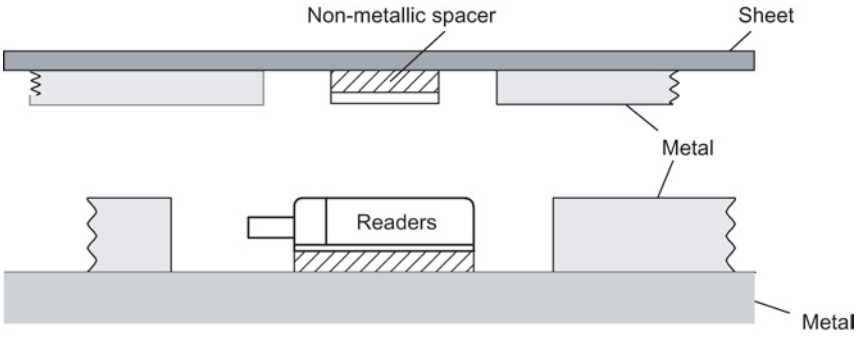
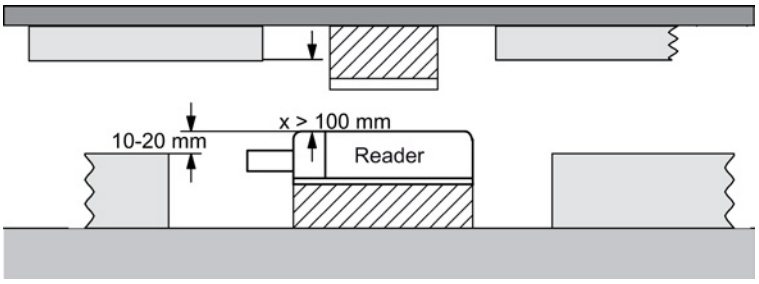
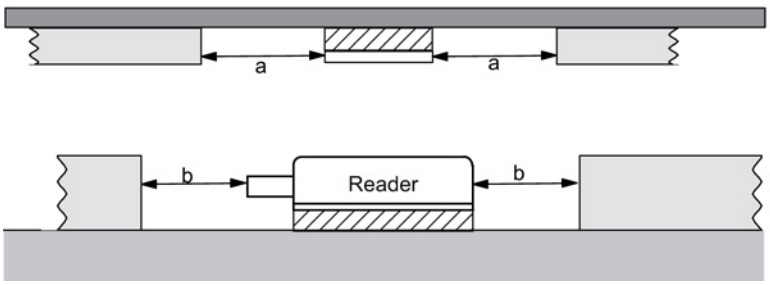
- Minimum spacing between two readers or their antennas
- Minimum distance between two adjacent data memories
- Metal-free area for flush-mounting of readers or their antennas and transponders in metal
- Mounting of multiple readers or their antennas on metal frames or racks

The following sections describe the impact on the operation of the RFID system when mounted in the vicinity of metal.

4.3.2 Reduction of interference due to metal

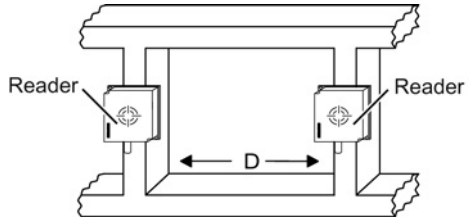
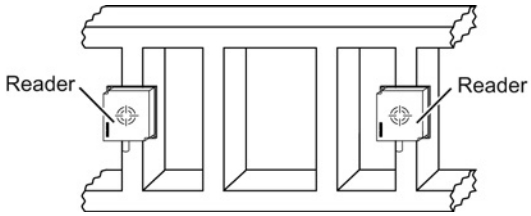
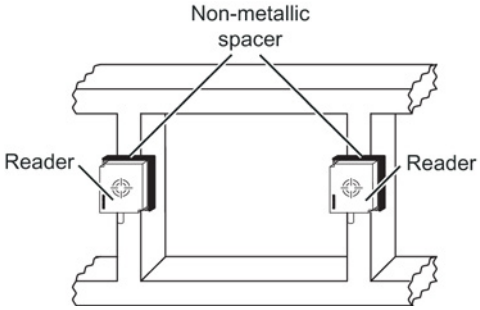
Interference due to metal rack	Problem
	A metal rack is located above the transmission window of the reader. This affects the entire field. In particular, the transmission window between reader and transponder is reduced.
	**Remedy:** The transmission window is no longer affected if the transponder is mounted differently.

Flush-mounting

Flush-mounting of transponders and readers	Problem
	Flush-mounting of transponders and readers is possible in principle. However, the size of the transmission window is significantly reduced. The following measures can be used to counteract the reduction of the window:
	**Remedy:** Enlargement of the non-metallic spacer below the transponder and/or reader. The transponder and/or reader are 10 to 20 mm higher than the metal surround. (The value x ≥ 100 mm is valid, for example, for RF260R. It indicates that, for a distance x ≥ 100 mm, the reader can no longer be significantly affected by metal.)
	**Remedy:** Increase the non-metallic distance a, b. The following rule of thumb can be used: • Increase a, b by a factor of 2 to 3 over the values specified for metal-free areas • Increasing a, b has a greater effect for readers or transponders with a large limit distance than for readers or transponders with a small limit distance.

Mounting of several readers on metal frames or racks

Any reader mounted on metal couples part of the field to the metal frame. There is normally no interaction as long as the minimum distance D and metal-free areas a, b are maintained. However, interaction may take place if an iron frame is positioned unfavorably. Longer data transfer times or sporadic error messages at the communication module are the result.

Mounting of several readers on metal racks	Problem: Interaction between readers
	**Remedy** Increase the distance D between the two readers.
	**Remedy** Introduce one or more iron struts in order to short-circuit the stray fields.
	**Remedy** Insert a non-metallic spacer of 20 to 40 millimeter thickness between the reader and the iron frame. This will significantly reduce the induction of stray fields on the rack:

4.3.3 Effects of metal on different transponders and readers

Mounting different transponders and readers on metal or flush-mounting

Certain conditions have to be observed when mounting the transponders and readers on metal or flush-mounting. For more information, please refer to the descriptions of the individual transponders and readers in the relevant section.

4.3.4 Impact of metal on the transmission window

In general, the following points should be considered when mounting RFID components:

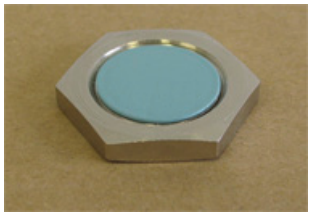
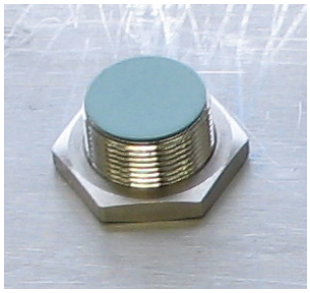
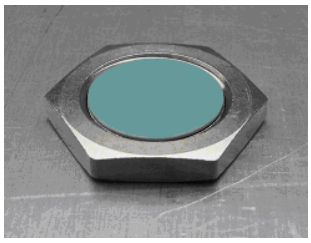
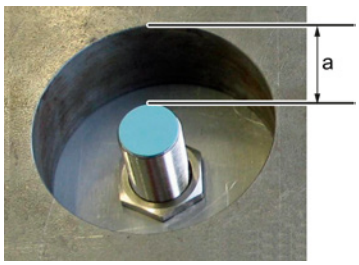
- Direct mounting on metal is allowed only in the case of specially approved transponders.
- Flush-mounting of the components in metal reduces the field data; a test is recommended in critical applications.
- When working inside the transmission window, it should be ensured that no metal rail (or similar part) intersects the transmission field.
  The metal rail would affect the field data.

The impact of metal on the field data (S_g, S_a, L) is shown in a table in this section. The values in the table describe the reduction of the field data in % with reference to non-metal (100% means no impact).

4.3.4.1 RF210R

The RF210R can be flush-mounted in metal. Please allow for a possible reduction in the field data values.

The following table shows the different arrangements for the reader with and without a metallic environment:

Case	Diagram	Description
a)		Reader metal-free
b)		Reader on metal, distance from metal ≥ 12 mm
c)		Reader in metal, flush against M18 nut
d)		Reader in metal, all around

To avoid any influence on the field data, in Case d, the distance a should be ≥ 10 mm.

Table 4- 17 Reduction of field data by metal: Transponder and RF210R

Transponder		Reader without direct metal influence (Case a, b and d)	Reader flush-mounted in metal (Case c)
MDS D124 [1]	metal-free	100	82
	on metal, distance 25 mm	90	90
	flush-mounted in metal; distance all round 25 mm	85	80
MDS D127	metal-free	not intended use	
	on metal	not intended use	
	flush-mounted in metal	100	75
MDS D160 [1]	metal-free	100	95
	on metal, distance 25 mm	100	95
	flush-mounted in metal; distance all round 25 mm	100	95
MDS D324 [1]	metal-free	100	90
	on metal, distance 25 mm	90	90
	flush-mounted in metal; distance all round 25 mm	80	90
MDS D421	metal-free	100	90
	flush-mounted in metal	75	50
MDS D422	metal-free	100	80
	flush-mounted in metal	90	40
MDS D423	metal-free	100	90
	screwed onto metal	180*	130*
	flush-mounted in metal	95	85
MDS D424 [1]	metal-free	100	60
	on metal, distance 25 mm	95	75
	flush-mounted in metal; distance all round 25 mm	80	70
MDS D425	metal-free	100	85
	screwed onto metal	100	85
	flush-mounted in metal; distance all round 25 mm	90	70
MDS D428	metal-free	100	90
	on metal	100	80
	flush-mounted in metal; distance all-round 25 mm	90	80

Transponder		Reader without direct metal influence (Case a, b and d)	Reader flush-mounted in metal (Case c)
MDS D460 [1]	metal-free	100	90
	on metal, distance 25 mm	100	90
	flush-mounted in metal; distance all round 25 mm	90	90

[1] Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

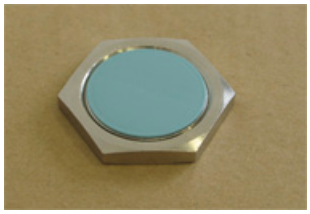
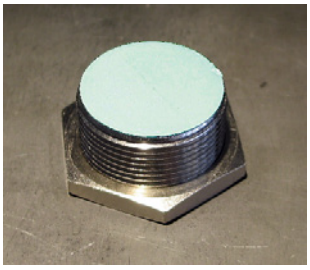
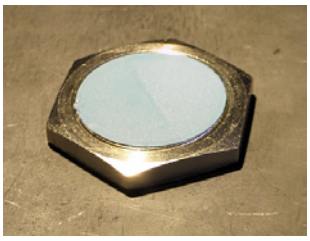
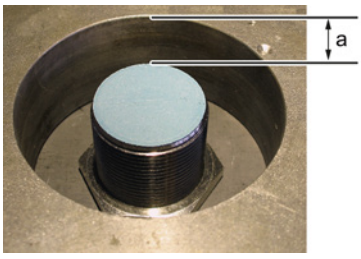
* Values of > 100 %, relative to non metal surroundings, can occur if transponders were developed specifically for mounting in/on metallic surroundings.

The values in the table describe the reduction of the field data. All values are percentages relative to non metal (100% means no influence).

4.3.4.2 RF220R

The RF220R can be flush-mounted in metal. Please allow for a possible reduction in the field data values.

The following table shows the different arrangements for the reader with and without a metallic environment:

Case	Diagram	Description
a)		Reader metal-free
b)		Reader on metal, distance from metal ≥ 12 mm
c)		Reader in metal, flush against M30 nut
d)		Reader in metal, all round

To avoid any influence on the field data, in Case d, the distance a should be ≥ 15 mm.

Table 4- 18 Reduction of field data by metal: Transponder and RF220R

Transponder		Reader without direct metal influence (Case a, b and d)	Reader flush-mounted in metal (Case c)
MDS D124 1)	metal-free	100	94
	on metal, distance 25 mm	97	89
	tag flush-mounted in metal; distance all round 25 mm	86	83
MDS D126 1)	metal-free	100	75
	on metal, distance 25 mm	85	70
	flush-mounted in metal; distance all round 25 mm	80	65
MDS D160 1)	metal-free	100	89
	on metal, distance 25 mm	100	89
	flush-mounted in metal; distance all round 25 mm	100	89
MDS D324 1)	metal-free	100	90
	on metal, distance 25 mm	97	86
	flush-mounted in metal; distance all round 25 mm	93	86
MDS D422	metal-free	100	90
	flush-mounted in metal	85	85
MDS D423	metal-free	100	90
	screwed onto metal	150*	85
	flush-mounted in metal	80	75
MDS D424 1)	metal-free	100	93
	on metal, distance 25 mm	96	89
	flush-mounted in metal; distance all round 25 mm	86	82
MDS D425	metal-free	100	90
	screwed onto metal	100	75
	flush-mounted in metal; distance all round 25 mm	95	75
MDS D426 1)	metal-free	100	90
	on metal, distance 25 mm	90	75
	flush-mounted in metal; distance all round 25 mm	80	70

Transponder		Reader without direct metal influence (Case a, b and d)	Reader flush-mounted in metal (Case c)
MDS D428	metal-free	100	94
	on metal	100	94
	flush-mounted in metal; distance all round 25 mm	94	94
MDS D460 [1)]	metal-free	100	92
	on metal, distance 25 mm	100	92
	flush-mounted in metal; distance all round 25 mm	100	92

1) Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

* Values of > 100 %, relative to non metal surroundings, can occur if transponders were developed specifically for mounting in/on metallic surroundings.

The values in the table describe the reduction of the field data. All values are percentages relative to non metal (100% means no influence).

4.3.4.3 RF240R

The RF240R can be flush-mounted in metal. Please allow for a possible reduction in the field data values.

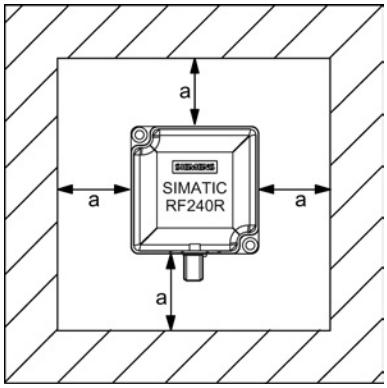


Figure 4-10 metal-free space RF240R

To avoid any impact on the field data, the distance a should be ≥ 20 mm.

Table 4- 19 Reduction of field data by metal: Transponder and RF240R

Transponder		Reader without direct metal influence	Reader on metal (metal plate)	Reader flush-mounted in metal (all round 20 mm)
MDS D100 [1]	without metal	100	95	80
	on metal	95	90	75
	flush-mounted in metal	90	75	70
MDS D124 [1]	without metal	100	85	75
	on metal, distance 25 mm	90	80	75
	flush-mounted in metal; distance all round 25 mm	85	70	65
MDS D126 [1]	without metal	100	80	70
	on metal, distance 25 mm	80	75	60
	flush-mounted in metal; distance all round 25 mm	70	55	55
MDS D160 [1]	without metal	100	90	80
	on metal, distance 25 mm	90	85	80
	flush-mounted in metal	not intended use		
MDS D165	without metal	100	95	75
	on metal, distance 20 mm	75	70	65
	flush-mounted in metal; distance all round 20 mm	70	65	60
MDS D200 [1]	without metal	100	95	85
	on metal, distance 20 mm	95	80	70
	flush-mounted in metal, distance all round 20 mm	70	60	50
MDS D261	without metal	100	90	90
	on metal, distance 20 mm	85	80	70
	flush-mounted in metal, distance all round 20 mm	80	70	65
MDS D324 [1]	without metal	100	90	80
	on metal, distance 25 mm	95	85	80
	flush-mounted in metal; distance all round 25 mm	90	75	70
MDS D400 [1]	without metal	100	90	80
	on metal, distance 20 mm	80	75	55
	flush-mounted in metal, distance all round 20 mm	75	70	50
MDS D422	without metal	100	90	85
	flush-mounted in metal	90	60	40
MDS D423	without metal	not intended use		
	on metal	100	90	85
	flush-mounted in metal; distance all round 10 mm	185	75	70

Transponder		Reader without direct metal influence	Reader on metal (metal plate)	Reader flush-mounted in metal (all round 20 mm)
MDS D424 [1]	without metal	100	85	80
	on metal, distance 25 mm	90	80	75
	flush-mounted in metal; distance all round 25 mm	80	70	65
MDS D425	without metal	100	90	85
	on metal, distance 25 mm	95	85	80
	flush-mounted in metal; distance all round 25 mm	90	75	70
MDS D426 [1]	without metal	100	80	70
	on metal, distance 25 mm	90	80	70
	flush-mounted in metal; distance all-round 25 mm	85	65	60
MDS D428	without metal	100	90	85
	on metal	95	85	83
	flush-mounted in metal; distance all round 25 mm	90	80	70
MDS D460 [1]	without metal	100	90	80
	on metal, distance 25 mm	90	85	80
	flush-mounted in metal	not intended use		

[1] Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

The values in the table describe the reduction of the field data. All values are percentages relative to non metal (100% means no influence).

4.3.4.4 RF250R

The RF250R reader is operated with the external antennas ANT 8, 12, 18 and 30. The antennas can be flush-mounted in metal. Please allow for a possible reduction in the field data values.

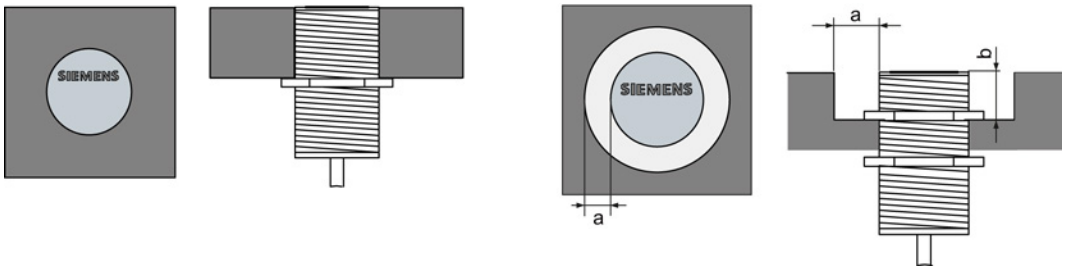


Figure 4-11 Metal-free space for ANT 8 / ANT 12 and ANT 18 / ANT 30

Table 4- 20 Reduction of field data by metal: Transponder and RF250R with ANT 8

Transponder		RF250R with ANT 8	
		antenna without metal	antenna flush-mounted in metal
MDS D117	without metal	100	85
	flush-mounted in metal	65	55
MDS D127	without metal	100	85
	flush-mounted in metal	70	60
MDS D421	without metal	100	85
	flush-mounted in metal	75	70

The values in the table describe the reduction of the field data. All values are percentages relative to non metal (100% means no influence).

Table 4- 21 Reduction of field data by metal: Transponder and RF250R with ANT 12

Transponder		RF250R with ANT 12	
		antenna without metal	antenna flush-mounted in metal (all round 7 mm)
MDS D117	without metal	100	85
	flush-mounted in metal	50	40
MDS D127	without metal	100	85
	flush-mounted in metal	65	50
MDS D160 [1)]	without metal	100	90
	on metal, distance 25 mm	90	85
	flush-mounted in metal; distance all round 25 mm	80	75
MDS D421	without metal	100	90
	flush-mounted in metal	65	45
MDS D422	without metal	100	90
	flush-mounted in metal	90	75
MDS D425	without metal	100	90
	screwed onto metal	115*	100
	flush-mounted in metal; distance all round 25 mm	110*	90
MDS D428	without metal	100	85
	screwed onto metal	110*	95
	flush-mounted in metal; distance all round 25 mm	95	90
MDS D460 [1)]	without metal	100	95
	on metal, distance 25 mm	90	80
	flush-mounted in metal; distance all round 25 mm	85	75

[1)] Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

* Values of > 100 %, relative to non metal surroundings, can occur if transponders were developed specifically for mounting in/on metallic surroundings.

The values in the table describe the reduction of the field data. All values are percentages relative to non metal (100% means no influence).

Table 4- 22 Reduction of field data by metal: Transponder and RF250R with ANT 18

Transponder		RF250R with ANT 18	
		antenna without metal	antenna flush-mounted in metal (all round 10 mm)
MDS D124 [1]	without metal	100	80
	on metal, distance 25 mm	100	80
	flush-mounted in metal; distance all round 25 mm	95	70
MDS D160 [1]	without metal	100	90
	on metal, distance 25 mm	100	90
	flush-mounted in metal; distance all round 25 mm	90	80
MDS D324 [1]	without metal	100	80
	on metal, distance 25 mm	100	80
	flush-mounted in metal; distance all round 25 mm	95	75
MDS D421	without metal	100	85
	flush-mounted in metal	65	50
MDS D422	without metal	100	100
	flush-mounted in metal	90	90
MDS D423	without metal	100	85
	screwed onto metal	160*	120*
	flush-mounted in metal; without surround	95	75
MDS D424 [1]	without metal	100	75
	on metal, distance 25 mm	95	75
	flush-mounted in metal; distance all round 25 mm	95	75
MDS D425	without metal	100	90
	screwed onto metal	100	90
	flush-mounted in metal; distance all round 25 mm	100	90
MDS D428	without metal	100	85
	screwed onto metal	100	85
	flush-mounted in metal; distance all round 25 mm	100	85

Transponder		RF250R with ANT 18	
		antenna without metal	antenna flush-mounted in metal (all round 10 mm)
MDS D460 [1]	without metal	100	85
	on metal, distance 25 mm	100	85
	flush-mounted in metal; distance all round 25 mm	95	80

[1] Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

* Values of > 100 %, relative to non metal surroundings, can occur if transponders were developed specifically for mounting in/on metallic surroundings.

The values in the table describe the reduction of the field data. All values are percentages relative to non metal (100% means no influence).

Table 4- 23 Reduction of field data by metal: Transponder and RF250R with ANT 30

Transponder		RF250R with ANT 30	
		antenna without metal	antenna flush-mounted in metal (all round 20 mm)
MDS D124 [1]	without metal	100	80
	on metal, distance 25 mm	90	75
	flush-mounted in metal; distance all round 25 mm	75	70
MDS D126 [1]	without metal	100	80
	on metal, distance 25 mm	85	75
	flush-mounted in metal; distance all round 25 mm	60	50
MDS D160 [1]	without metal	100	85
	on metal, distance 25 mm	95	80
	flush-mounted in metal; distance all round 25 mm	80	70
MDS D324 [1]	without metal	100	80
	on metal, distance 25 mm	95	75
	flush-mounted in metal; distance all round 25 mm	85	70
MDS D422	without metal	100	95
	flush-mounted in metal	95	80
MDS D423	without metal	100	90
	screwed onto metal	130*	110*
	flush-mounted in metal; without surround	80	70

Transponder		RF250R with ANT 30	
		antenna without metal	antenna flush-mounted in metal (all round 20 mm)
MDS D424 [1]	without metal	100	85
	on metal, distance 25 mm	90	75
	flush-mounted in metal; distance all round 25 mm	75	70
MDS D425	without metal	100	90
	screwed onto metal	95	75
	flush-mounted in metal; distance all round 25 mm	90	70
MDS D426 [1]	without metal	100	70
	on metal, distance 25 mm	90	65
	flush-mounted in metal; distance all round 25 mm	55	45
MDS D428	without metal	100	90
	screwed onto metal	130*	110*
	flush-mounted in metal; distance all round 25 mm	80	90
MDS D460 [1]	without metal	100	85
	on metal, distance 25 mm	90	75
	flush-mounted in metal; distance all round 25 mm	85	70

[1] Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

* Values of > 100 %, relative to non metal surroundings, can occur if transponders were developed specifically for mounting in/on metallic surroundings.

The values in the table describe the reduction of the field data. All values are percentages relative to non metal (100% means no influence).

4.3.4.5 RF260R

The RF260R can be flush-mounted in metal. Please allow for a possible reduction in the field data values.

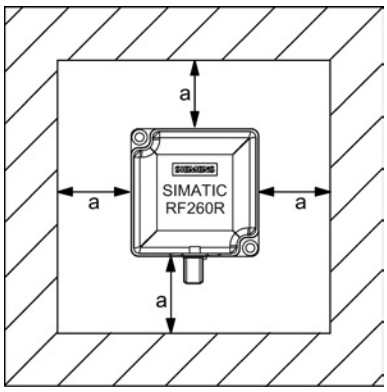


Figure 4-12 metal-free space for RF260R

To avoid any impact on the field data, the distance a should be ≥ 20 mm.

Table 4- 24 Reduction of field data by metal: Transponder and RF260R

Transponder		Reader without direct metal influence	Reader on metal (metal plate)	Reader flush-mounted in metal (all round 20 mm)
MDS D100 [1)]	without metal	100	85	65
	on metal, distance 20 mm	70	65	50
	flush-mounted in metal; distance all round 20 mm	65	50	40
MDS D124 [1)]	without metal	100	93	75
	on metal, distance 25 mm	95	85	70
	flush-mounted in metal; distance all round 25 mm	78	75	65
MDS D126 [1)]	without metal	100	85	73
	on metal, distance 25 mm	75	68	60
	flush-mounted in metal; distance all round 25 mm	55	53	40
MDS D139 [1)]	without metal	100	90	75
	on metal, distance 30 mm	95	90	75
	flush-mounted in metal	not intended use		
MDS D160 [1)]	without metal	100	90	75
	on metal, distance 25 mm	90	80	80
	flush-mounted in metal	not intended use		

Transponder		Reader without direct metal influence	Reader on metal (metal plate)	Reader flush-mounted in metal (all round 20 mm)
MDS D165	without metal	100	85	65
	on metal, distance 20 mm	65	60	45
	flush-mounted in metal; distance all round 20 mm	55	50	40
MDS D200 [1)]	without metal	100	85	70
	on metal, distance 20 mm	70	65	50
	flush-mounted in metal, distance all round 20 mm	55	50	45
MDS D261	without metal	100	85	70
	on metal, distance 20 mm	80	70	60
	flush-mounted in metal; distance all round 20 mm	75	65	50
MDS D324 [1)]	without metal	100	90	75
	on metal, distance 25 mm	90	80	70
	flush-mounted in metal; distance all round 25 mm	70	65	55
MDS D339 [1)]	without metal	100	90	75
	on metal, distance 30 mm	95	90	75
	flush-mounted in metal	not intended use		
MDS D400 [1)]	without metal	100	85	70
	on metal, distance 20 mm	70	65	50
	flush-mounted in metal; distance all round 20 mm	55	50	45
MDS D423	without metal	not intended use		
	on metal	100	90	80
	flush-mounted in metal; distance all round 10 mm	75	65	60
MDS D424 [1)]	without metal	100	90	80
	on metal, distance 25 mm	90	80	70
	flush-mounted in metal; distance all round 25 mm	60	60	50
MDS D426 [1)]	without metal	100	100	73
	on metal, distance 25 mm	88	85	68
	flush-mounted in metal; distance all round 25 mm	65	55	55
MDS D428	without metal	100	90	90
	on metal	90	90	85
	flush-mounted in metal; distance all round 25 mm	80	75	65

Transponder		Reader without direct metal influence	Reader on metal (metal plate)	Reader flush-mounted in metal (all round 20 mm)
MDS D460 [1]	without metal	100	95	90
	on metal, distance 25 mm	90	85	80
	flush-mounted in metal	not intended use		

[1] Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

The values in the table describe the reduction of the field data. All values are percentages relative to non metal (100% means no influence).

4.3.4.6 RF290R

The RF290R reader is operated with the external antennas ANT D5, D6 and D10. The antennas can be flush-mounted in metal. Please allow for a possible reduction in the field data values.

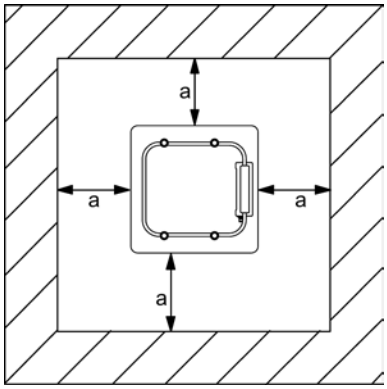


Figure 4-13 Metal-free space for ANT D5

To avoid any influence on the field data, the distance a should be ≥ 150 or 200 mm.

Table 4- 25 Reduction of field data by metal: Transponder and RF290R with ANT D5

Transponder		RF290R with ANT D5	
		Antenna on metal (metal plate)	antenna flush-mounted in metal (all round 150 mm)
MDS D100 1)	without metal	100	95
	on metal, distance 20 mm	65	60
	flush-mounted in metal; distance all round 20 mm	45	40
MDS D124 1)	without metal	100	95
	on metal, distance 25 mm	85	80
	flush-mounted in metal; distance all round 25 mm	65	60
MDS D126 1)	without metal	100	95
	on metal, distance 25 mm	70	65
	flush-mounted in metal; distance all round 25 mm	55	50
MDS D139 1)	without metal	100	95
	on metal, distance 30 mm	90	85
	flush-mounted in metal	not intended use	
MDS D160 1)	without metal	100	95
	on metal, distance 25 mm	70	65
	flush-mounted in metal; distance all round 25 mm	25	20
MDS D165	without metal	100	95
	on metal, distance 20 mm	65	60
	flush-mounted in metal; distance all round 20 mm	45	40
MDS D200 1)	without metal	100	95
	on metal, distance 20 mm	65	60
	flush-mounted in metal; distance all round 20 mm	45	40
MDS D261	without metal	100	95
	on metal, distance 20 mm	65	60
	flush-mounted in metal; distance all round 20 mm	50	45
MDS D324 1)	without metal	100	95
	on metal, distance 25 mm	75	70
	flush-mounted in metal	not intended use	
MDS D339 1)	without metal	100	95
	on metal, distance 30 mm	90	85
	flush-mounted in metal	not intended use	

Transponder		RF290R with ANT D5	
		Antenna on metal (metal plate)	antenna flush-mounted in metal (all round 150 mm)
MDS D400 [1]	without metal	100	95
	on metal, distance 20 mm	65	60
	flush-mounted in metal; distance all round 20 mm	45	40
MDS D424 [1]	without metal	100	95
	on metal, distance 25 mm	75	70
	flush-mounted in metal	not intended use	
MDS D426 [1]	without metal	100	95
	on metal, distance 25 mm	70	65
	flush-mounted in metal; distance all round 25 mm	50	45
MDS D460 [1]	without metal	100	95
	on metal, distance 25 mm	70	65
	flush-mounted in metal	not intended use	

[1] Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

The values in the table describe the reduction of the field data. All values are percentages relative to non metal (100% means no influence).

Table 4- 26 Reduction of field data by metal: Transponder and RF290R with ANT D6

Transponder		RF290R with ANT D6	
		Antenna on metal (metal plate)	antenna flush-mounted in metal (all round 200 mm)
MDS D100 [1]	without metal	100	95
	on metal, distance 20 mm	65	60
MDS D124 [1]	without metal	100	95
	on metal, distance 25 mm	80	75
MDS D126 [1]	without metal	100	95
	on metal, distance 25 mm	65	60
MDS D139 [1]	without metal	100	90
	on metal, distance 30 mm	80	70
MDS D160 [1]	without metal	100	90
	on metal, distance 25 mm	60	55
MDS D165	without metal	100	95
	on metal, distance 20 mm	50	45
MDS D200 [1]	without metal	100	95
	on metal, distance 20 mm	65	60

Transponder		RF290R with ANT D6	
		Antenna on metal (metal plate)	antenna flush-mounted in metal (all round 200 mm)
MDS D261	without metal	100	95
	on metal, distance 20 mm	50	45
MDS D324 [1]	without metal	100	95
	on metal, distance 25 mm	75	70
MDS D339 [1]	without metal	100	90
	on metal, distance 30 mm	80	70
MDS D400 [1]	without metal	100	95
	on metal, distance 20 mm	60	55
MDS D424 [1]	without metal	100	95
	on metal, distance 25 mm	75	70
MDS D426 [1]	without metal	100	95
	on metal, distance 25 mm	65	60

[1] Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

The values in the table describe the reduction of the field data. All values are percentages relative to non metal (100% means no influence).

Table 4- 27 Reduction of field data by metal: Transponder and RF290R with ANT D10

Transponder		RF290R with ANT D10	
		Antenna on metal (metal plate)	antenna flush-mounted in metal (all round 200 mm)
MDS D100 [1]	without metal	100	95
	on metal, distance 20 mm	50	40
MDS D124 [1]	without metal	100	90
	on metal, distance 25 mm	70	60
MDS D126 [1]	without metal	100	95
	on metal, distance 25 mm	65	60
MDS D139 [1]	without metal	100	90
	on metal, distance 30 mm	80	70
MDS D160 [1]	without metal	100	90
	on metal, distance 25 mm	60	55
MDS D165	without metal	100	90
	on metal, distance 20 mm	40	30
MDS D200 [1]	without metal	100	95
	on metal, distance 20 mm	50	40
MDS D261	without metal	100	90
	on metal, distance 20 mm	40	30

Transponder		RF290R with ANT D10	
		Antenna on metal (metal plate)	antenna flush-mounted in metal (all round 200 mm)
MDS D324 [1]	without metal	100	90
	on metal, distance 25 mm	70	60
MDS D339 [1]	without metal	100	90
	on metal, distance 30 mm	80	70
MDS D400 [1]	without metal	100	95
	on metal, distance 20 mm	50	40
MDS D424 [1]	without metal	100	90
	on metal, distance 25 mm	70	60
MDS D426 [1]	without metal	100	95
	on metal, distance 25 mm	70	65

[1] Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

The values in the table describe the reduction of the field data. All values are percentages relative to non metal (100% means no influence).

4.3.5 Installation and connection of 2 to 6 antennas with one reader

If several antennas need to be operated on one reader, this can be achieved by using the antenna splitter or the antenna multiplexer RF260X.

Note that the antenna splitter is a purely passive device that splits the power at the input to two outputs and therefore halves it. This is possible both in PC mode (RS-232) and CM mode (RS-422). You can cascade the antenna splitters in such a way that up to 4 antennas can be connected at the same time.

The antenna multiplexer RF260X works only in PC mode (RS-232) in time division multiplex mode. This means that each antenna operates with full power for a certain time before the device moves on automatically to the next antenna. The antenna multiplexer normally operates in scan mode or buffered read mode which add the information about the antenna number to the reply of the transponder. With the antenna multiplexer, you can connect up to 6 antennas.

4.3.5.1 Installation options with the antenna splitter (2-4 antennas)

Possible configurations of the antennas

The antenna installations described here have been designed for reading smartlabels (transponders) on goods on conveyor belts, conveyor systems or pallets.

A prerequisite is that there are no magnetically conducting materials (e.g. metal) in the vicinity of the antenna or the label.

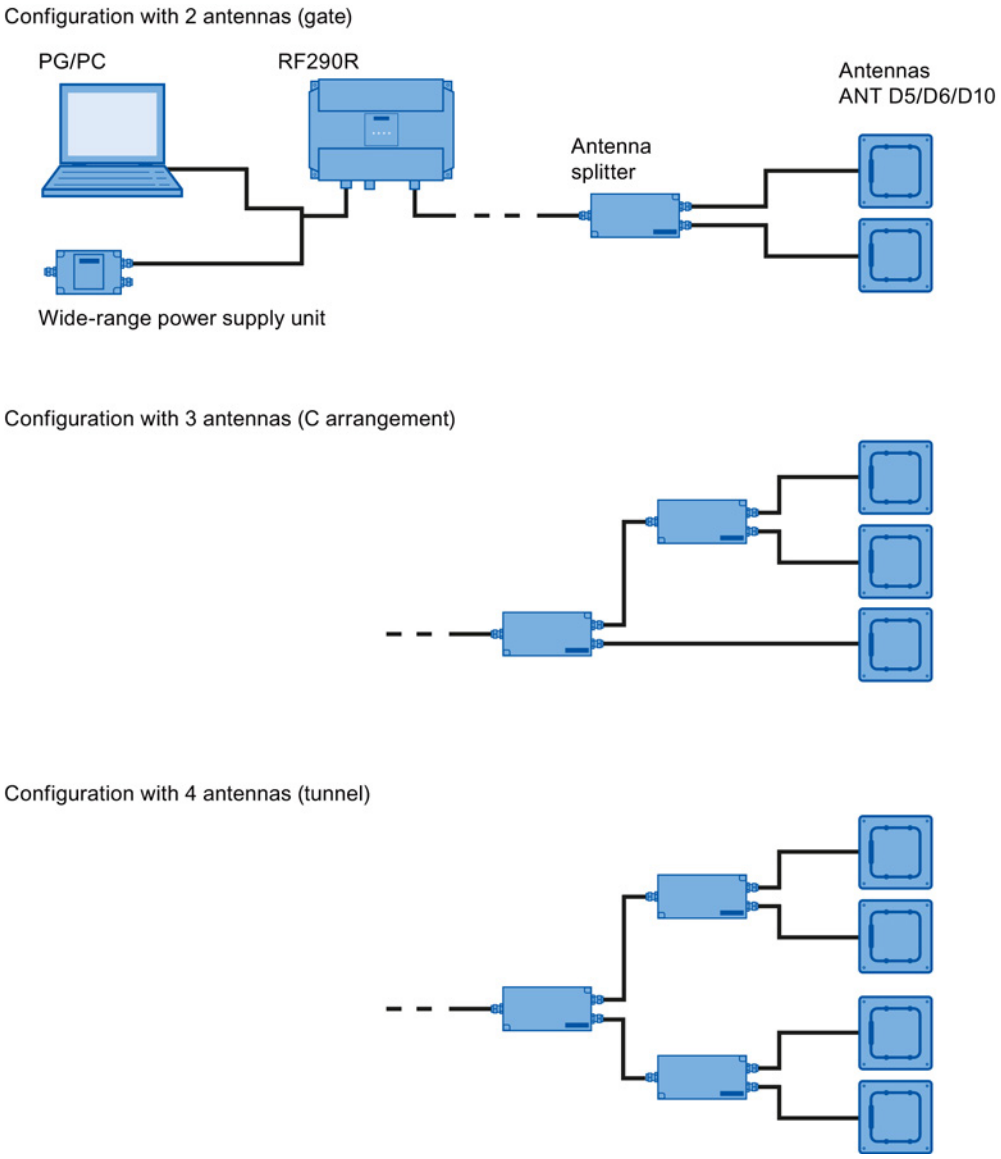


Figure 4-14 Possible configuration of RF290R with ANT D5/D6/D10

Installation examples

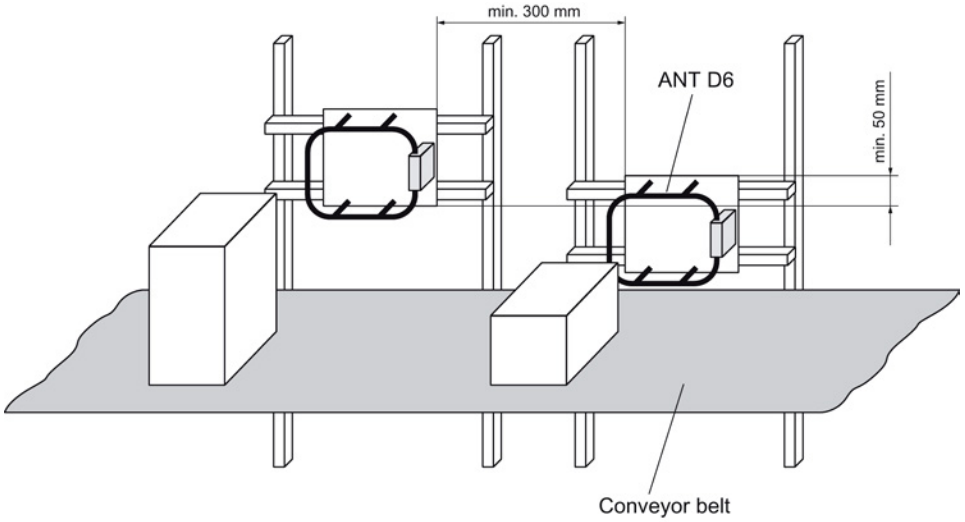


Figure 4-15 Installation example with 2 ANT D6 (portal)

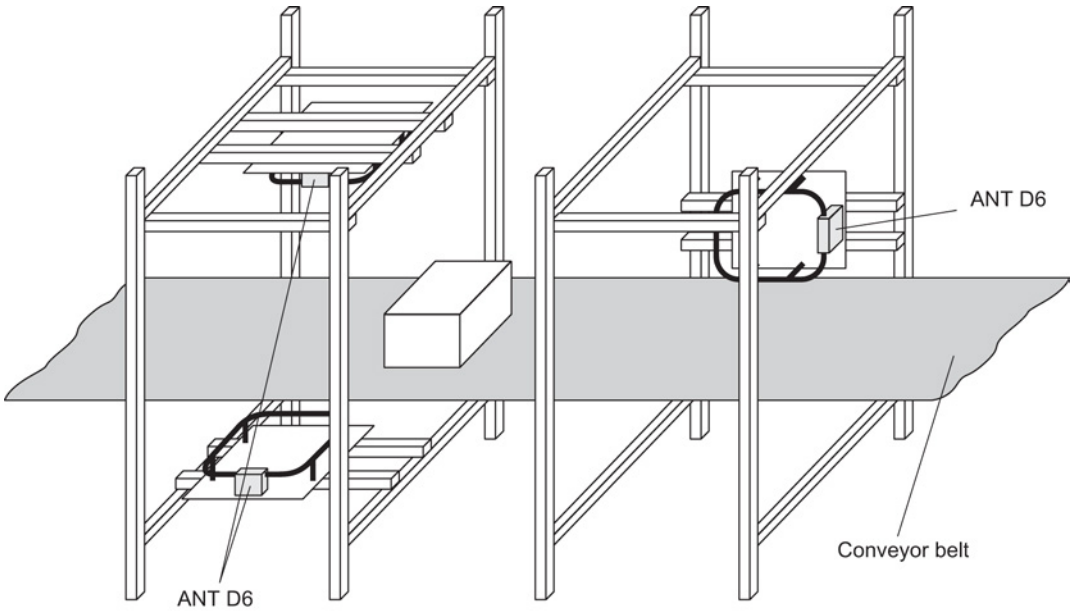


Figure 4-16 Installation example with ANT D6 (C arrangement)

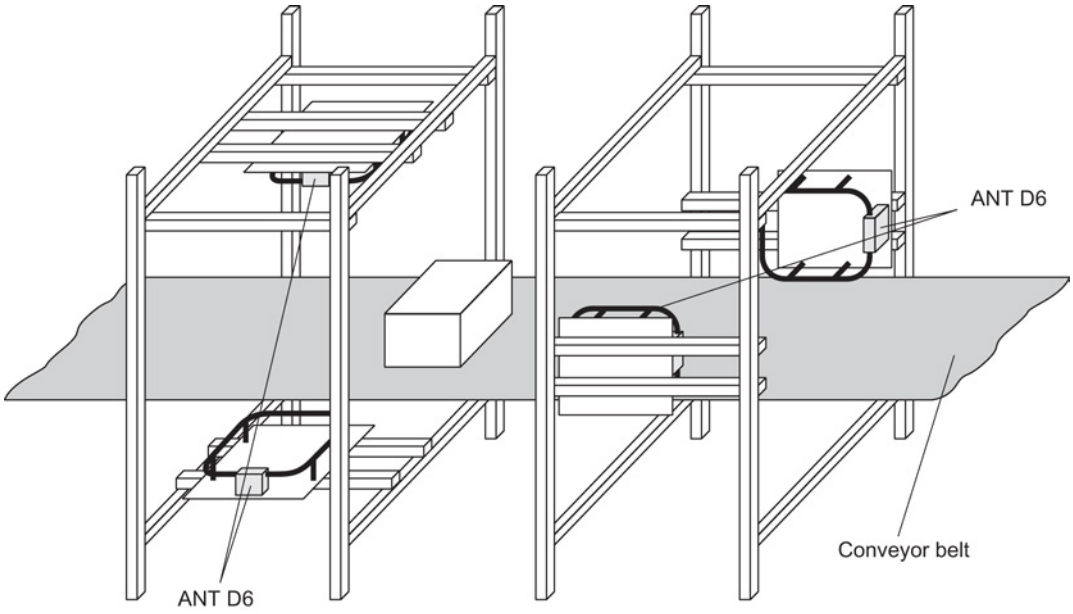


Figure 4-17 Installation example with ANT D6 (tunnel)

Note

The minimum spacings between the antennas for operation with only one reader may be less than the distances described because this configuration has the same phase.

4.3.5.2 Antenna installation

Configuring instructions

The antenna installation described below enables detection of transponders moving horizontally through the installation. Depending on the installation (antennas exactly opposite each other or offset in parallel), the label is aligned in parallel with the antennas or arbitrarily.

The size of the sensing range depends on the label alignment:

Note

Remember that the entire acquisition range of the antenna is larger than the transmission window in which the transponder is normally configured. This means there can be label alignments where even labels outside the transmission window will be identified. Labels aligned in parallel with the antennas, for example, can also be detected at larger distances beside or outside the antenna range.

For this reason, goods with labels must not be stored within a distance of up to 0.5 m from the installation. If this cannot be complied with, the antennas must be shielded.

To achieve three-dimensional detection of the labels in the sensing range, the following requirements must be met:

- The gate width must be less than or equal to 800 mm.
- The antenna size of the labels should be at least the size of an ISO card (85 mm x 54 mm).
- The distance from label to label must be greater than 100 mm. The distance from label to label can be reduced if the gate width is correspondingly reduced. This applies especially for distances under 50 mm.
- There should be no more than 16 labels within the sensing range of the antennas at the same time.
  The number of labels can be increased if the gate width is correspondingly reduced and the maximum speed suitably adapted.
- The maximum speed of the labels must not exceed 1 m/s. (This depends on the number and alignment of the labels, the number of data blocks to be processed, the data protocol required and the label type).
- To the front and sides of the antenna, there must be a distance of more than 150 mm to metal parts.
- There must be no interference to the write/read device from other electrical equipment in the surrounding area.

Note

The RF290R reader is not capable of multitag operation in the CM mode.

Required components

For installation with

- 2 antennas (gate)
- 3 antennas (C arrangement)
- 4 antennas (tunnel)

the following components are required:

Table 4- 28 Components required for setting up with 2, 3 or 4 antennas

Number for installation with			Component	Order number
2 ant.	3 ant.	4 ant.		
1	1	1	Basic device: RF290R (↔ CM or PC)	RF290R: 6GT2821-0AC12 optionally: ASM 475: 6GT2002-0GA10 ASM 456: 6GT2002-0ED00 RF170C: 6GT2002-0HD00 RF180C: 6GT2002-0JD00 RF182C: 6GT2002-0JD10
2	3	4	Antenna ANT D5 / D6 / D10	optionally: ANT D5: 6GT2698-5AA10 ANT D6: 6GT2698-5AB00 ANT D10: 6GT2698-5AF00
2	3	4	With ANT D6 if required: cover	6GT2698-5AD00
1	2	3	Antenna splitter	6GT2603-0AC00
1	1	1	MOBY wide-range power supply unit for SIMATIC RF systems (for PC mode only)	EU: 6GT2898-0AA00 UK: 6GT2898-0AA10 US: 6GT2898-0AA20
1	1	1	24 V connecting cable, length 5 m (for PC mode only)	6GT2491-1HH50
1	1	1	Connecting cable: RF290R ↔ PC or RF290R ↔ CM	6GT2891-4KH ... optionally: 6GT2891-4F ... 6GT2891-4EH ...

Installation information

The cables on the antennas and the antenna splitter are 3.3 m or 10.5 m long. The write/read device must be installed in the vicinity of the antennas. If there are greater distances between the write/read device and the antennas, the antenna cable can be increased by 7.2 m with the extension (6GT2 691-0DH72). This results in shorter ranges.

Metal-free space

To guarantee perfect functioning of the individual installation versions, all larger metal parts in the vicinity of the antennas must be removed.

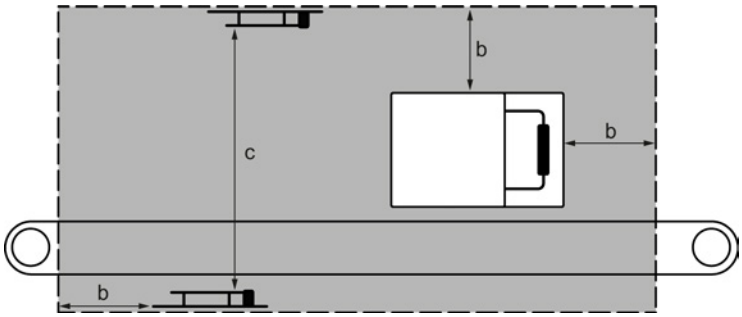
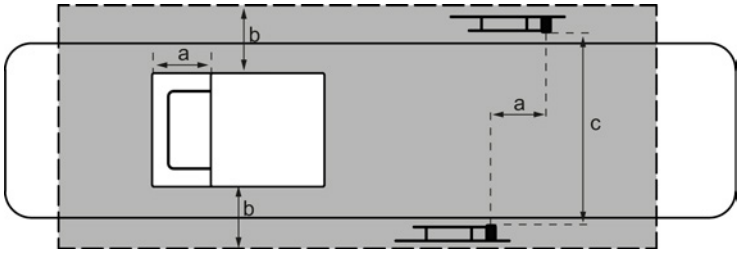


Figure 4-18 Metal-free space, side view (based on the example of a tunnel arrangement on a conveyor belt)



a approx. half antenna length
b min. 100 mm
c max. 600 mm
Metal-free space

Figure 4-19 Metal-free space, view from above (based on the example of a tunnel arrangement on a conveyor belt)

Metal in the vicinity of the antennas

If metal in the vicinity of the antennas cannot be avoided, the following must be noted:

- There must be a minimum allround gap of 100 mm between the antenna and metal. Serious loss of sensing range must be expected above 50 mm. There is no discernible influence at distances greater than 150 mm from the metal.
- The influence of the metal depends heavily on its size and shape. Thin metal rods have less influence on the magnetic field than large surfaces.
- Larger metal surfaces (edge length > 50 mm) in parallel with the antennas or labels result in a short-circuit of the magnetic lines of force. As a result, the labels cannot be read.
- Metal parts under the conveyor belt change the direction of the magnetic lines of force. Serious loss of sensing range must be expected as a result. Horizontally aligned labels cannot be read in such cases.
- **The metal parts must not form closed loops or circuits. If necessary, these must be electrically interrupted at one point**.

- The metal parts in the immediate vicinity of the antenna must be grounded in a mesh with a good HF connection.
- Since the write/read device is installed in a metal housing, and the antennas can couple into the cables to the write/read device, it must be installed at a distance of at least 500 mm from the antennas.

Notes on installing and laying the antenna cable

To suppress possible interference, an EMC hinged ferrite choke must be fitted to the antenna cables (as well as the antenna cable between the reader and the antenna splitter). The coaxial cable must be wound tightly at least four times through the EMC ring core. The maximum distance between the connecting plug for the reader or the antenna splitter and the ring core must be 100 mm.

The antenna cable must always be run vertically from the antennas. A minimum distance of 200 mm to the antennas must be observed as the cables continue. Otherwise, performance losses must be expected.

There must be a distance of at least 300 mm between antenna cables and parallel power cables.

Unrequired cable length must be secured in a bundle with a diameter of 100 to 150 mm.

If the standard antenna cable is too short, it can be increased by 7.20 m with the extension. Slight range losses must be expected here.

To achieve optimal read ranges, the antenna cable should not be shortened or lengthened.

4.3.5.3 Installation options with the antenna multiplexer (2-6 antennas)

You can operate up to six antennas on one reader via the multiplexer.

The data is processed sequentially.

Antenna switchover is performed in time-multiplex mode, so by connecting several antennas together, the processing time / activation time per antenna is lengthened accordingly.

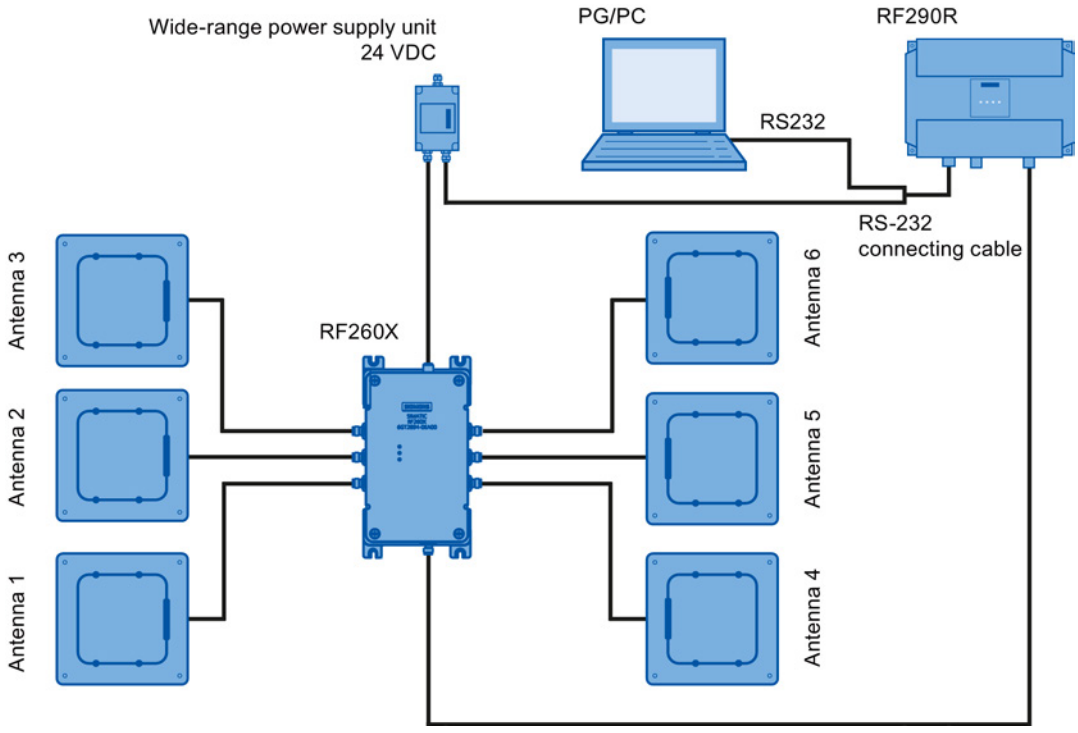


Figure 4-20 Configuration example of the antenna multiplexer with ANT D5

4.4 Further information

Further information on "Fundamentals of application planning" and "EMC" can be found in RF300 system manual (http://support.automation.siemens.com/WW/view/en/18722182).

Readers

5

NOTICE
Pulling and plugging readers Pull or plug the reader only when the power supply is turned off If this is not observed, under certain conditions, the reader will not start up correctly and communication with a transponder will not be possible.

Note

IO-Link variants of the RF200 readers

The IO-Link variants of the readers are not included in the system manual. You will find these in the "SIMATIC RF200 IO-Link (http://support.automation.siemens.com/WW/view/en/60641859)" operating instructions.

5.1 SIMATIC RF210R

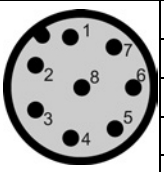
5.1.1 Features

SIMATIC RF210R	Characteristics	
	Field of application	Identification tasks on assembly lines in harsh industrial environments
	Design	① RS422 interface ② Status display

5.1.2 RF210R ordering data

	Article number
RF210R with RS422 interface (3964R)	6GT2821-1AC10

5.1.3 Pin assignment RF210R with RS422 interface

Pin	Pin Device end 8-pin M12	Assignment
	1	+ 24 V
	2	- Transmit
	3	0 V
	4	+ Transmit
	5	+ Receive
	6	- Receive
	7	Unassigned
	8	Ground (shield)

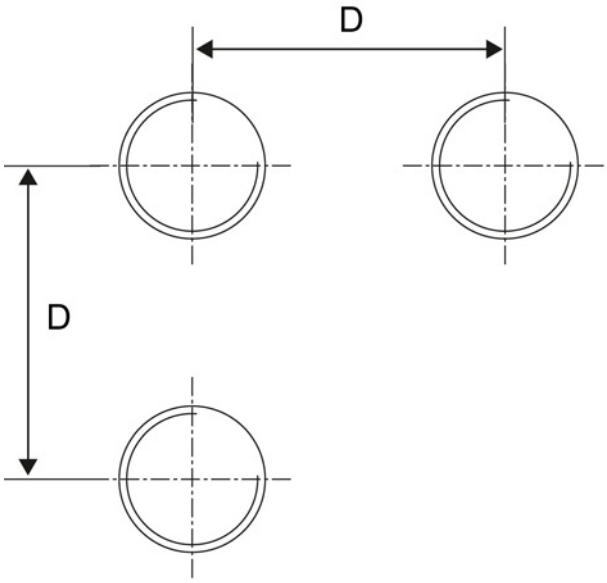
5.1.4 Display elements of the RF210R reader

Color		Meaning
green	flashing	Operating voltage present, reader not initialized or antenna switched off
	permanently lit	Operating voltage present, reader initialized and antenna switched on
yellow[1)]		Transponder present
flashing red		Error has occurred, the type of flashing corresponds to the error code in the table in the section "Error codes". The optical error display is only reset if the corresponding reset parameter ("option_1 = 2") is set (see Product information "SIMATIC RF200 command set" (http://support.automation.siemens.com/WW/view/en/44864850)).

1) Only in the "with presence" mode.

5.1.5 Minimum distance between RF210R readers

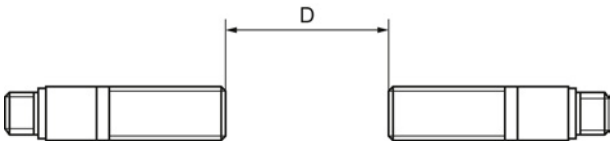
RF210R side by side



D ≥ 60 mm

Figure 5-1 Minimum distance between RF210R readers

RF210R face to face



D ≥ 100 mm

Figure 5-2 Face-to-face distance between two RF210Rs

5.1.6 Technical specifications of the RF210R reader

	6GT2821-1AC10
Product type designation	RF210R
Inductive interface to the transponder Transmission frequency for power/data	 13.56 MHz
Antenna	integrated
Interface to the communications module	RS-422 (3964R protocol)
Baud rate	19200, 57600, 115200 baud
Cable length reader ↔ communications module	max. 1000 m (shielded cable)
Read/write distances of reader	Refer to chapter Field data (Page 35)
Maximum data transmission rate reader ↔ transponder (tag)	
• Read	• approx. 1.5 KBps
• Write	• approx. 1.5 KBps
Power supply	24 VDC
Display elements	3-color LED (operating voltage, presence, error)
Plug connector	M12 (8-pin)
Housing	
• Dimensions (L × ∅)	• 83 × 18 mm (incl. 8-pin connector sleeve and plastic cap)
• Color	• Silver
• Material	• Brass, nickel-plated
Securing	2 metal M18 × 1 hexagonal nuts; Thickness: 4 mm, tightening torque ≤ 20 Nm
Ambient temperature	
• During operation	• -20 °C ... +70 °C
• During transportation and storage	• -25 °C ... +80 °C
Degree of protection to EN 60529 Shock to EN 60721-3-7 Class 7 M2 Vibration to EN 60721-3-7 Class 7 M2	IP67 50 g 20 g
Weight	approx. 65 g (incl. two M18 nuts)
Approvals	Radio to R&TTE guidelines EN 300 330, EN 301489, CE, FCC, UL/CSA
Current consumption	typ. 50 mA

5.1.7 Approvals

FCC information

Siemens SIMATIC RF210R (MLFB 6GT2821-1AC10) FCC ID NXW-RF210R

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) This device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d`Industrie Canada applicables aux appareils radio exempts de licence. L`exploitation est autorisée aux deux conditions suivantes :

(1) L`appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l`appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d`en compromettre le fonctionnement.

5.1.8 Dimension drawing

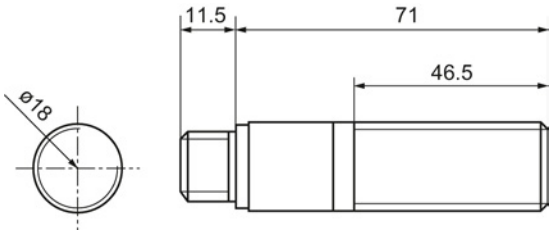
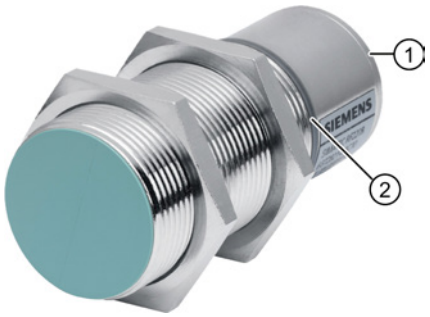


Figure 5-3 RF210R dimension drawing

Dimensions in mm

5.2 SIMATIC RF220R

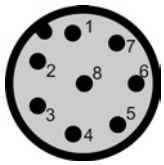
5.2.1 Features

SIMATIC RF220R	Characteristics	
	Field of application	Identification tasks on assembly lines in harsh industrial environments
	Design	① RS422 interface ② Status display

5.2.2 RF220R ordering data

	Article number
RF220R with RS-422 interface (3964R)	6GT2821-2AC10

5.2.3 RF220R pin assignment with RS422 interface

Pin	Pin Device end 8-pin M12	Assignment
	1	+ 24 V
	2	- Transmit
	3	0 V
	4	+ Transmit
	5	+ Receive
	6	- Receive
	7	Unassigned
	8	Ground (shield)

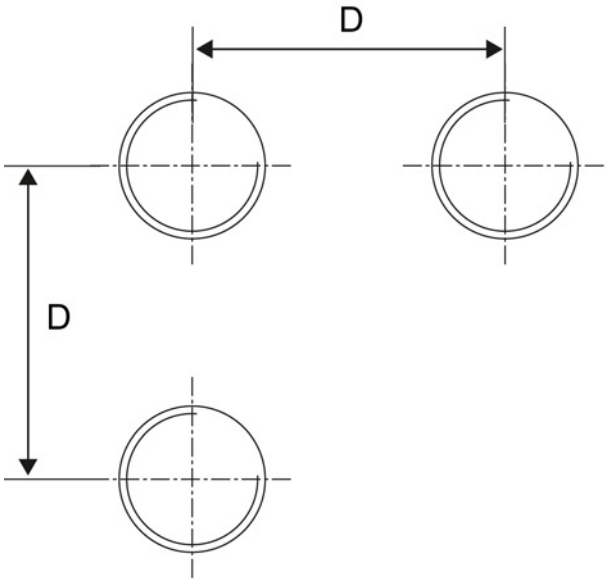
5.2.4 Display elements of the RF220R reader

Color		Meaning
green	flashing	Operating voltage present, reader not initialized or antenna switched off
	permanently lit	Operating voltage present, reader initialized and antenna switched on
yellow[1)]		Transponder present
flashing red		Error has occurred, the type of flashing corresponds to the error code in the table in the section "Error codes". The optical error display is only reset if the corresponding reset parameter ("option_1 = 2") is set (see Product information "SIMATIC RF200 command set" (http://support.automation.siemens.com/WW/view/en/44864850)).

1) Only in the "with presence" mode.

5.2.5 Minimum distance between RF220R readers

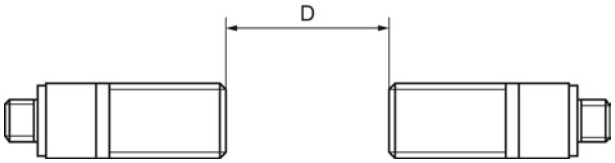
RF220R side by side



D ≥ 100 mm

Figure 5-4 Minimum distance between RF220R readers

RF220R face to face



D ≥ 150 mm

Figure 5-5 Face-to-face distance between two RF220Rs

5.2.6 Technical specifications of the RF220R reader

	6GT2821-2AC10
Product type designation	RF220R
Inductive interface to the transponder Transmission frequency for power/data	 13.56 MHz
Antenna	integrated
Interface to the communications module	RS-422 (3964R protocol)
Baud rate	19200, 57600, 115200 baud
Cable length reader ↔ communications module	max. 1000 m (shielded cable)
Read/write distances of reader	Refer to chapter Field data (Page 35)
Maximum data transmission rate reader ↔ transponder (tag)	
• Read	• approx. 1.5 KBps
• Write	• approx. 1.5 KBps
Power supply	24 VDC
Display elements	3-color LED (operating voltage, presence, error)
Plug connector	M12 (8-pin)
Housing	
• Dimensions (L × ∅)	• 83 × 30 mm (incl. 8-pin connector sleeve and plastic cap)
• Color	• Silver
• Material	• Brass, nickel-plated
Securing	2 metal M30 × 1.5 hexagonal nuts; Thickness: 5 mm, tightening torque ≤ 40 Nm
Ambient temperature	
• During operation	• -20 °C ... +70 °C
• During transportation and storage	• -25 °C ... +80 °C
Degree of protection to EN 60529 Shock to EN 60721-3-7 Class 7 M2 Vibration to EN 60721-3-7 Class 7 M2	IP67 50 g 20 g
Weight	approx. 140 g (incl. two M30 nuts)
Approvals	Radio to R&TTE guidelines EN 300 330, EN 301489, CE, FCC, UL/CSA
Current consumption	typ. 50 mA

5.2.7 Approvals

FCC information

Siemens SIMATIC RF220R (MLFB 6GT2821-2AC10) FCC ID NXW-RF220R

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) This device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d`Industrie Canada applicables aux appareils radio exempts de licence. L`exploitation est autorisée aux deux conditions suivantes :

(1) L`appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l`appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d`en compromettre le fonctionnement.

5.2.8 Dimension drawing

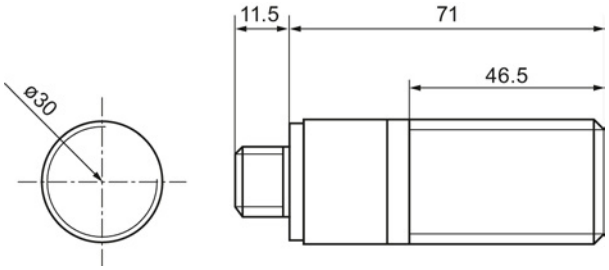


Figure 5-6 RF220R dimension drawing

Dimensions in mm

5.3 SIMATIC RF240R

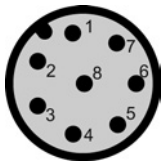
5.3.1 Features

SIMATIC RF240R	Characteristics		
	Field of application	Identification tasks on assembly lines in harsh industrial environments	
	Design	①	Depending on the device variant: :RS-422 or RS-232 interface
		②	Status indicator

5.3.2 RF240R ordering data

	Article number
RF240R with RS-422 interface (3964R)	6GT2821-4AC10
RF240R with RS-232 interface (3964R)	6GT2821-4AC11
RF240R with RS-232 interface (ASCII)	6GT2821-4AC40

5.3.3 Pin assignment RF240R

Pin	Pin	Interface assignment	
	Device end 8-pin M12	RS-422	RS-232
	1	+24 V	+24 V
	2	- Transmit	RXD
	3	0 V	0 V
	4	+ Transmit	TXD
	5	+ Receive	Unassigned
	6	- Receive	Unassigned
	7	Unassigned	Unassigned
	8	Ground (shield)	Ground (shield)

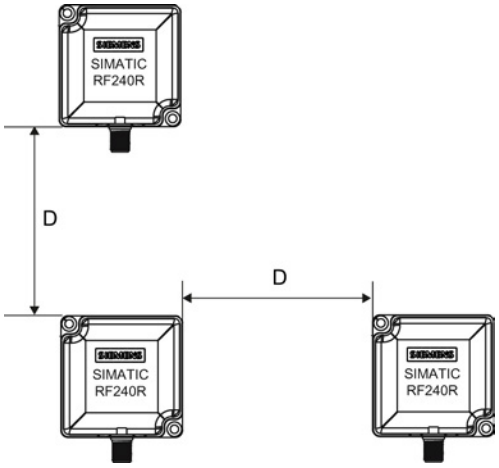
5.3.4 Display elements of the RF240R reader

Color		Meaning
green	flashing	Operating voltage present, reader not initialized or antenna switched off
	permanently lit	Operating voltage present, reader initialized and antenna switched on
yellow[1)]		Transponder present
flashing red		Error has occurred, the type of flashing corresponds to the error code in the table in the section "Error codes". The optical error display is only reset if the corresponding reset parameter ("option_1 = 2") is set (see Product information "SIMATIC RF200 command set" (http://support.automation.siemens.com/WW/view/en/44864850)).

[1)] Only in the "with presence" mode.

5.3.5 Minimum distance between several RF240R readers

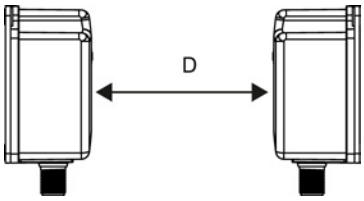
RF240R readers side by side



D ≥ 120 mm (with 2 readers)
D ≥ 200 mm (with more than 2 readers)

Figure 5-7 Minimum distance between several RF240R readers

RF240R face-to-face



D ≥ 400 mm

Figure 5-8 Face-of-face distance between two RF240R readers

5.3.6 Technical specifications of the RF240R reader

	6GT2821-4AC10 6GT2821-4AC11 6GT2821-4AC40
Product type designation	RF240R
Inductive interface to the transponder Transmission frequency for power/data	 13.56 MHz
Antenna	integrated
Interface	
• Communications module	• RS-422 (3964R protocol)
• PC	• RS-232 (3964R or ASCII protocol)
Baud rate	19200, 57600, 115200 baud
Cable length reader ↔ communications module	RS-422: max. 1000 m RS-232: Max. 30 m (shielded cable)
Read/write distances of reader	Refer to chapter Field data (Page 35)
Maximum data transmission rate reader ↔ transponder (tag)	
• Read	• approx. 1.5 KBps
• Write	• approx. 1.5 KBps
Power supply	24 VDC
Display elements	3-color LED (operating voltage, presence, error)
Plug connector	M12 (8-pin)
Housing	
• Dimensions (L × W × H)	• 50 × 50 × 30 mm (without M12 device connector)
• Color	• Anthracite
• Material	• Plastic PA 6.6
Securing	2 x M5 screws Tightening torque ≤ 1.5 Nm
Ambient temperature	
• During operation	• -20 °C ... +70 °C
• During transportation and storage	• -25 °C ... +80 °C
Degree of protection to EN 60529	IP67
Shock to EN 60721-3-7 Class 7 M2 Vibration to EN 60721-3-7 Class 7 M2	50 g 20 g
Weight	Approx. 60 g
Approvals	Radio to R&TTE guidelines EN 300 330, EN 301489, CE, FCC, UL/CSA
Current consumption	typ. 25 mA

5.3.7 Approvals

FCC information

Siemens SIMATIC RF240R (MLFB 6GT2821-4AC10) FCC ID NXW-RF240R

Siemens SIMATIC RF240R (MLFB 6GT2821-4AC11) FCC ID NXW-RF240R

Siemens SIMATIC RF240R (MLFB 6GT2821-4AC40) FCC ID NXW-RF240R

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) This device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d`Industrie Canada applicables aux appareils radio exempts de licence. L`exploitation est autorisée aux deux conditions suivantes :

(1) L`appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l`appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d`en compromettre le fonctionnement.

5.3.8 Dimension drawing

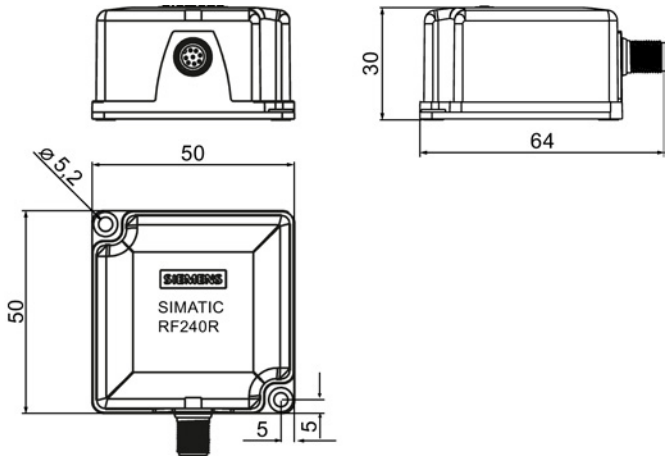


Figure 5-9 Dimension drawing RF240R

Dimensions in mm

5.4 SIMATIC RF250R

5.4.1 Features

SIMATIC RF250R	Characteristics		
	Area of application	Identification tasks on assembly lines in harsh industrial environments	
	Design	①	Depending on the device variant: :RS-422 or RS-232 interface
		②	Status indicator
		③	Antenna connector, M8

Note

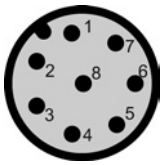
Reader requires external antennas

Note that the RF250R reader is designed only for operation with external antennas and can only be operated in conjunction with the antennas ANT 8, ANT 12, ANT 18 or ANT 30.

5.4.2 Ordering data RF250R

	Article number
RF250R with RS-422 interface (3964R)	6GT2821-5AC10
RF250R with RS-232 interface (ASCII)	6GT2821-5AC40

5.4.3 Pin assignment RF250R

Pin	Pin	Interface assignment	
	Device end 8-pin M12	RS-422	RS-232
	1	+24 V	+24 V
	2	- Transmit	RXD
	3	0 V	0 V
	4	+ Transmit	TXD
	5	+ Receive	Unassigned
	6	- Receive	Unassigned
	7	Unassigned	Unassigned
	8	Ground (shield)	Ground (shield)

5.4.4 Display elements of the RF250R reader

Color		Meaning
green	flashing	Operating voltage present, reader not initialized or antenna switched off
	permanently lit	Operating voltage present, reader initialized and antenna switched on
yellow[1)]		Transponder present
flashing red		Error has occurred, the type of flashing corresponds to the error code in the table in the section "Error codes". The optical error display is only reset if the corresponding reset parameter ("option_1 = 2") is set (see Product information "SIMATIC RF200 command set" (http://support.automation.siemens.com/WW/view/en/44864850)).

1) Only in the "with presence" mode.

5.4.5 Technical specifications of the RF250R reader

	6GT2821-5AC10 6GT2821-5AC40
Product type designation	RF250R
Inductive interface to the transponder Transmission frequency for power/data	 13.56 MHz
Connectable antennas	ANT 8, ANT 12, ANT 18, ANT 30
Interface	
• Communications module • PC	• RS-422 (3964R protocol) • RS-232 (ASCII protocol)
Baud rate	19200, 57600, 115200 baud
Cable length reader ↔ communications module	RS-422: max. 1000 m RS-232: Max. 30 m (shielded cable)
Transmit power	180 mW (50 ohms)
Read/write distances of reader	Refer to chapter Field data (Page 35)
Maximum data transmission rate reader ↔ transponder (tag)	
• Read • Write	• approx. 1.5 KBps • approx. 1.5 KBps
Power supply	24 VDC
Display elements	3-color LED (operating voltage, presence, error)
Connection	
• Power supply/data line • Antenna	• M12, 8-pin, male • M8, 4-pin, female
Housing	
• Dimensions (L × W × H) • Color • Material	• 50 × 50 × 30 mm (without M12 device connector) • Anthracite • Plastic PA 6.6
Securing	2 x M5 screws Tightening torque ≤ 1.5 Nm
Ambient temperature	
• During operation • During transportation and storage	• -20 °C ... +70 °C • -25 °C ... +80 °C
Degree of protection to EN 60529 Shock to EN 60721-3-7 Class 7 M2 Vibration to EN 60721-3-7 Class 7 M2	IP67 50 g 20 g
Weight	Approx. 60 g

	6GT2821-5AC10 6GT2821-5AC40
Approvals	Radio to R&TTE guidelines EN 300 330, EN 301489, CE, FCC, UL/CSA
Current consumption	typ. 35 mA

5.4.6 Approvals

FCC information

Siemens SIMATIC RF250R (MLFB 6GT2821-5AC10) FCC ID NXW-RF250R

Siemens SIMATIC RF250R (MLFB 6GT2821-5AC40) FCC ID NXW-RF250R

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) This device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d`Industrie Canada applicables aux appareils radio exempts de licence. L`exploitation est autorisée aux deux conditions suivantes :

(1) L`appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l`appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d`en compromettre le fonctionnement.

If the antenna is detachable, require the following two conditions:

(1) To reduce potential radio interference to other users, the antenna type should be chosen that the radiated power is not more than that permitted for successful communication.

(2) This device has been designed to operate with the antennas listed below. Antennas not included in this list are strictly prohibited for use with this device. The required antenna impedance is 50 Ω.

Si l'antenne est amovible, demandez les deux conditions suivantes :

(1) Afin de réduire le risque d'interférence aux autres utilisateurs, il faut choisir le type d'antenne et son gain de façon à ce que la puissance rayonnée ne soit pas supérieure au niveau requis pour l'obtention d'une communication satisfaisante.

(2) Ce dispositif a été conçu pour fonctionner avec les antennes énumérées ci-dessous. Les antennes non incluses dans cette liste sont strictement interdites pour l'exploitation de ce dispositif. L'impédance d'antenne requise est 50 Ω.

5.4.7 Dimension drawing

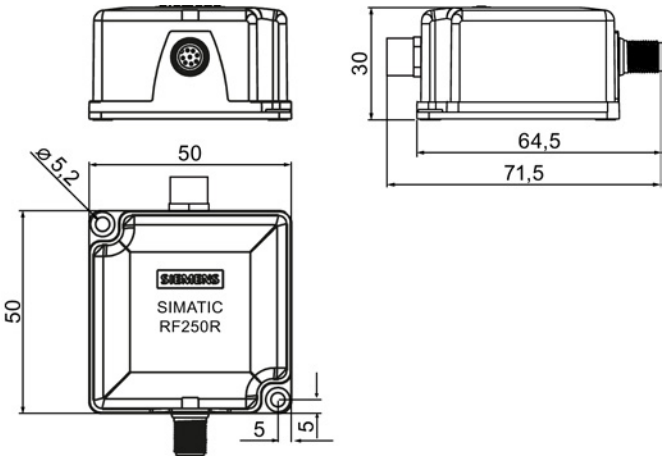


Figure 5-10 Dimension drawing RF250R

Dimensions in mm

5.5 SIMATIC RF260R

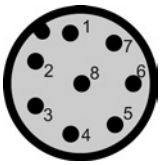
5.5.1 Features

SIMATIC RF260R	Characteristics		
	Field of application	Identification tasks on assembly lines in harsh industrial environments	
	Design	①	Depending on the device variant: RS-422 or RS-232 interface
		②	Status indicator

5.5.2 Ordering data for RF260R

	Article number
RF260R with RS-422 interface (3964R)	6GT2821-6AC10
RF260R with RS-232 interface (3964R)	6GT2821-6AC11
RF260R with RS-232 interface (ASCII)	6GT2821-6AC40

5.5.3 Pin assignment RF260R

Pin	Pin Device end 8-pin M12	Interface assignment	
		RS-422	RS-232
	1	+24 V	+24 V
	2	- Transmit	RXD
	3	0 V	0 V
	4	+ Transmit	TXD
	5	+ Receive	Unassigned
	6	- Receive	Unassigned
	7	Unassigned	Unassigned
	8	Ground (shield)	Ground (shield)

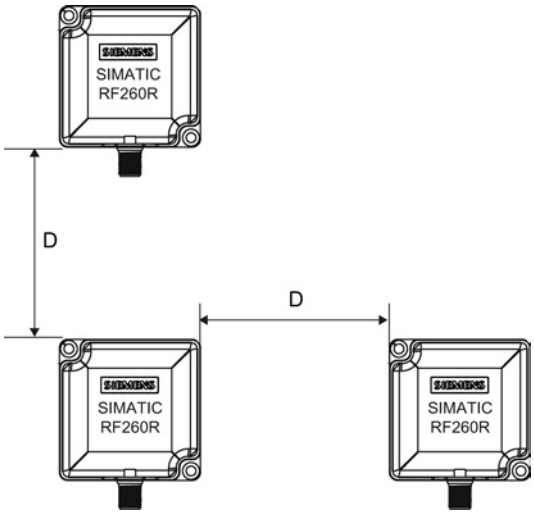
5.5.4 Display elements of the RF260R reader

Color		Meaning
green	flashing	Operating voltage present, reader not initialized or antenna switched off
	permanently lit	Operating voltage present, reader initialized and antenna switched on
yellow[1)]		Transponder present
flashing red		Error has occurred, the type of flashing corresponds to the error code in the table in the section "Error codes". The optical error display is only reset if the corresponding reset parameter ("option_1 = 2") is set (see Product information "SIMATIC RF200 command set" (http://support.automation.siemens.com/WW/view/en/44864850)).

1) Only in the "with presence" mode.

5.5.5 Minimum distance between several RF260R

RF260R side by side

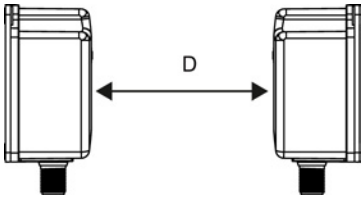


D ≥ 150 mm (with 2 readers)

D ≥ 250 mm (with more than 2 readers)

Figure 5-11 Minimum distance between several RF260R

RF260R face to face



D ≥ 500 mm

Figure 5-12 Face-to-face distance between two RF260R

5.5.6 Technical data of the RF260R reader

	6GT2821-6AC10 6GT2821-6AC11 6GT2821-6AC40
Product type designation	RF260R
Inductive interface to the transponder Transmission frequency for power/data	13.56 MHz
Antenna	integrated
Interface	
• Communications module	• RS-422 (3964R protocol)
• PC	• RS-232 (3964R or ASCII protocol)
Baud rate	19200, 57600, 115200 baud
Cable length reader ↔ communications module	RS-422: max. 1000 m RS-232: Max. 30 m (shielded cable)
Read/write distances of reader	Refer to chapter Field data (Page 35)
Maximum data transmission rate reader ↔ transponder (tag)	
• Read	• approx. 1.5 KBps
• Write	• approx. 1.5 KBps
Power supply	24 VDC
Display elements	3-color LED (operating voltage, presence, error)
Plug connector	M12 (8-pin)
Housing	
• Dimensions (L × W × H)	• 75 × 75 × 41 mm (without M12 device connector)
• Color	• Anthracite
• Material	• Plastic PA 6.6
Securing	2 x M5 screws Tightening torque ≤ 1.5 Nm
Ambient temperature	
• During operation	• -20 °C ... +70 °C
• During transportation and storage	• -25 °C ... +80 °C
Degree of protection to EN 60529	IP67
Shock to EN 60721-3-7 Class 7 M2 Vibration to EN 60721-3-7 Class 7 M2	50 g 20 g
Weight	Approx. 200 g
Approvals	Radio to R&TTE guidelines EN 300 330, EN 301489, CE, FCC, UL/CSA
Current consumption	typ. 50 mA

5.5.7 Approvals

FCC information

Siemens SIMATIC RF260R (MLFB 6GT2821-6AC10) FCC ID NXW-RF260R

Siemens SIMATIC RF260R (MLFB 6GT2821-6AC11) FCC ID NXW-RF260R

Siemens SIMATIC RF260R (MLFB 6GT2821-6AC40) FCC ID NXW-RF260R

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) This device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d`Industrie Canada applicables aux appareils radio exempts de licence. L`exploitation est autorisée aux deux conditions suivantes :

(1) L`appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l`appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d`en compromettre le fonctionnement.

5.5.8 Dimension drawing

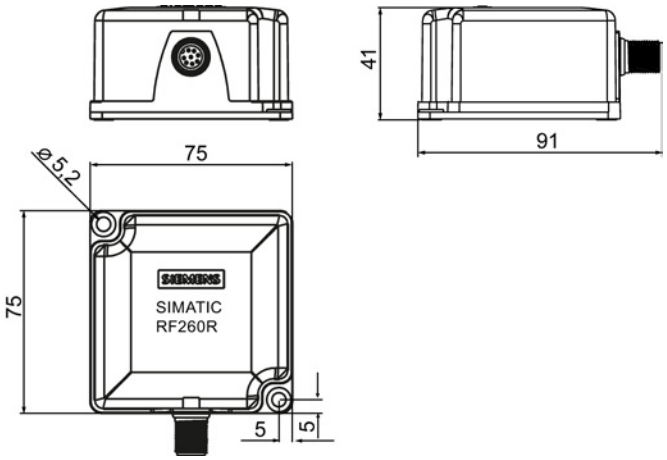


Figure 5-13 Dimension drawing RF260R

Dimensions in mm

5.6 SIMATIC RF290R

5.6.1 Features

SIMATIC RF290R	Characteristics	
	Area of application	Identification tasks in production control and in intra-logistics, e.g. skid identification, container management, HF gates (F&B)
	Design	① RS-422/RS-232 interface, 24 V power supply
		② Digital I/O
		③ External antenna
		④ Operating display, 4 LEDs: • Power (PWR) • Active (ACT) • Present (PRE) • Error (ERR)

Note

Reader requires external antennas

Note that the RF290R reader is designed only for operation with external antennas and can only be operated in conjunction with the antennas ANT D5, D6 or D10.

5.6.2 Ordering data RF290R

Table 5- 1 Ordering data RF290R

	Article number
RF290R with RS-232 interface for PC mode and RS-422 interface for CM mode	6GT2821-0AC12

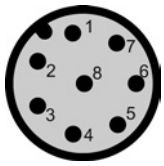
Table 5- 2 Ordering data - accessories - RF290R

		Article number
24 V connecting cable	5 m	6GT2491-1HH50
RS-232 connecting cable, with 4-pin M12 connector for 24 V for connection to the wide-range power supply unit	5 m	6GT2891-4KH50
RS-232 connecting cable with open cable ends for 24 V	5 m	6GT2891-4KH50-0AX0
Adapter for mounting on a DIN rail (pack of 3)		6GK5798-8ML00-0AB3
Wide-range power supply unit for SIMATIC RF-systems (100 - 240 VAC / 24 VDC / 3 A) with 2 m connecting cable with country-specific plug		EU: 6GT2898-0AA00 UK: 6GT2898-0AA10 US: 6GT2898-0AA20
Connecting cables		
Reader ↔ ASM 475	2 m	6GT2891-4EH20
	5 m	6GT2891-4EH50
Connecting / extension cable		
Reader ↔ CM/ASM for RF200 / RF300 / RF600 / MV400 or extension cable MOBY U/D	2 m	6GT2891-4FH20
	5 m	6GT2891-4FH50
	10 m	6GT2891-4FN10
	20 m	6GT2891-4FN20
	50 m	6GT2891-4FN50
Antennas		
Antenna ANT D5		6GT2698-5AA10
Antenna ANT D6		6GT2698-5AB00
Covering hood for ANT D6		6GT2690-0AD00
Antenna ANT D10		6GT2698-5AF00
Accessories for connecting multiple antennas to SIMATIC RF290R		
Antenna multiplexer incl. one antenna connecting cable 0.4 m		6GT2894-0EA00
Antenna splitter incl. one antenna connecting cable 3.3 m		6GT2690-0AC00
Antenna cables		
Antenna cable	3.3 m	6GT2691-0CH33
	10.5 m	6GT2691-0CN10
Antenna cable extension	7.2 m	6GT2691-0DH72

5.6.3 Pin assignment RF290R

RS422/RS232

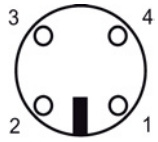
Table 5- 3 Pin assignment of the RS-422/RS 232 interface

Pin	Pin Device end 8-pin M12	Interface assignment	
		RS-422	RS-232
	1	+24 V	+24 V
	2	- Transmit	RXD
	3	0 V	0 V
	4	+ Transmit	TXD
	5	+ Receive	not used
	6	- Receive	not used
	7	not used	not used
	8	Ground (shield)	Ground (shield)

Digital I/O

only possible in PC mode (RS-232)

Table 5- 4 Pin assignment of the digital I/O interface

Pin	Pin Device end 4-pin M12	Socket assignment
	1	DO - relay contact COM (Common)
	2	DO - relay contact NO (Normaly Open, NO contact)
	3	DI - switched input, +24 V
	4	DI - ground, 0 V

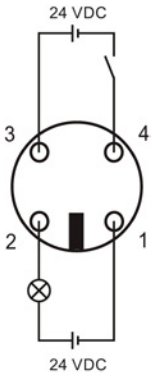


Figure 5-14 Pin assignment of the power supply connector

Digital input (DI):

The opto-coupler input is electrically isolated from the reader electronics. The external 24 V must be connected to the DI according to the circuit diagram. Make sure that the polarity of the 24 V is correct. The current is limited to < 10 mA by the integrated resistor.

NOTICE
Reader may be damaged If you exceed the maximum permitted supply voltage, the reader may be damaged. Make sure that the input voltage does not exceed the maximum permitted supply voltage of the reader.

Digital output (DO):

At the relay output, a NO contact is available. The output is electrically isolated from the reader electronics and therefore needs to be supplied externally.

NOTICE
Reader may be damaged If you exceed the maximum permitted voltage of 24 V / 1 A at the relay output, the reader may be damaged. Make sure that the voltage does not exceed 24 V. The output is intended only for switching resistive loads. If it is used to switch inductive loads, the reader may be damaged. Make sure that if inductive loads occur, the relay contacts are protected by an external suppressor circuit.

5.6.4 Display elements of the RF290R reader

LED		Meaning
PWR	flashing	CM mode: Operating voltage present, reader not initialized or antenna switched off
	permanently lit	CM mode: Operating voltage present, reader initialized and antenna switched on PC mode: Supply voltage applied
ACT		Communication on the data line
PRE		Presence of a transponder in the antenna field
ERR		CM mode: flashing: The type of flashing corresponds to the error code in the table in the section "Error codes". The optical error display is only reset if the corresponding reset parameter ("option_1 = 2") is set (see product information "SIMATIC RF200 command set (http://support.automation.siemens.com/WW/view/en/44864850)"). PC mode: permanently lit: Error when connecting the antenna or the interference level in the antenna environment is too high

5.6.5 Installing the RF290R reader

5.6.5.1 Wall mounting

Use the holes in the housing to screw the device to the wall or onto a horizontal surface. The position of the drill holes is shown in the following figure:

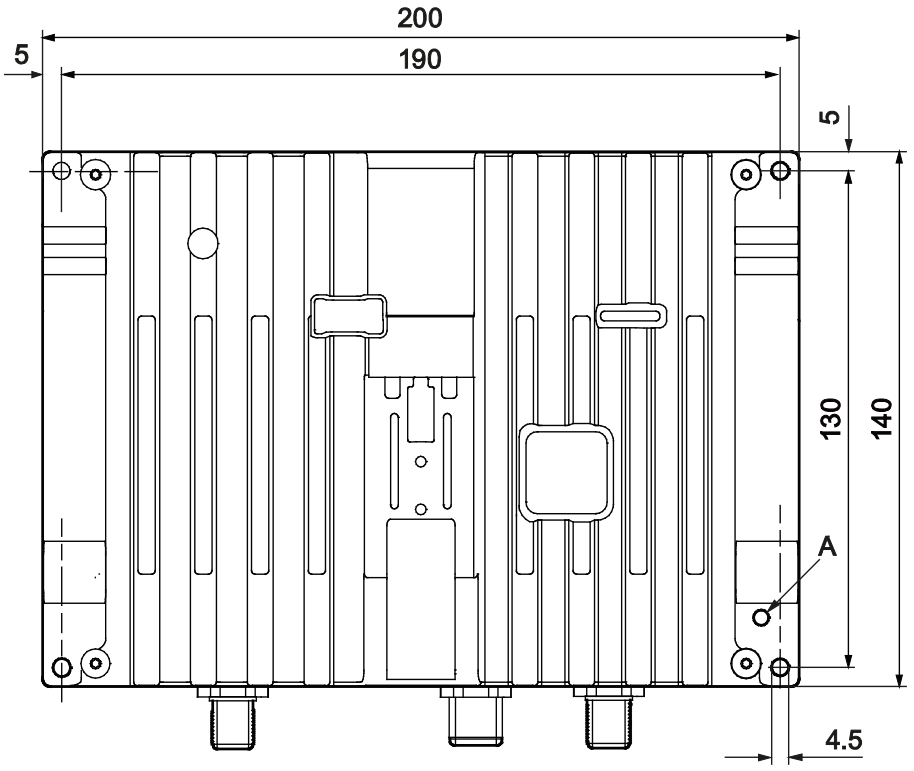


Figure 5-15 Drilling pattern for the RF290R (dimensions in mm)

A: M4 threaded socket for potential connection of the reader. You will find further information on the potential connection in the section "Further information (Page 74)".

5.6.5.2 Installing on the S7-300 standard rail

Follow the steps below to mount the RF290R reader on a vertical S7-300 standard rail:

1. Place the device on the upper edge of the S7-300 standard rail (position A).
2. Screw the device to the rail with the supplied screws (position B).

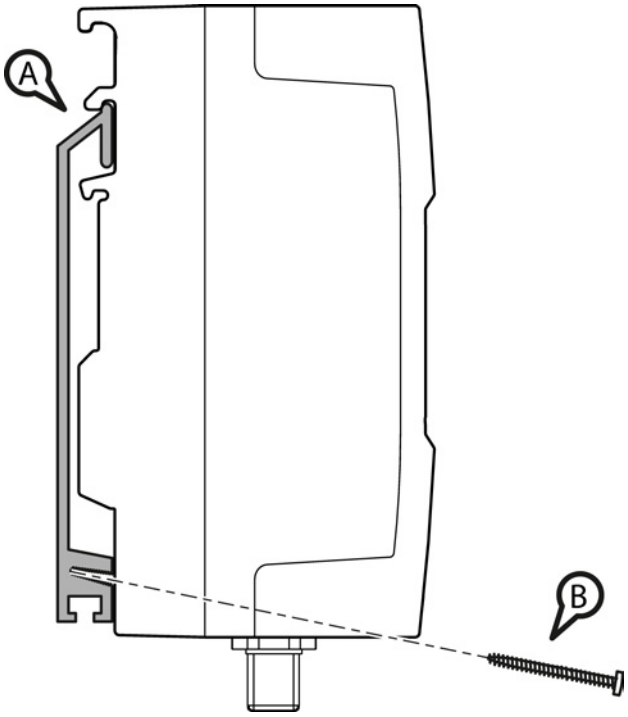


Figure 5-16 Installing the RF290R reader on the S7-300 standard rail

5.6.5.3 Installation on a DIN rail

The RF290R reader is suitable for installation on 35 mm rails that comply with DIN EN 50022.

Note

The adapter for mounting on a DIN rail does not ship with the RF290R

The adapter for mounting on a DIN rail does not ship with the product. You can obtain a pack of three with the following order number: 6GK5798-8ML00-0AB3.

The mounting fittings consist of the following parts:

- 1 DIN rail slider
- 1 spring
- 2 screws

Fit the adapter to the rear of the device as shown in the following figure:

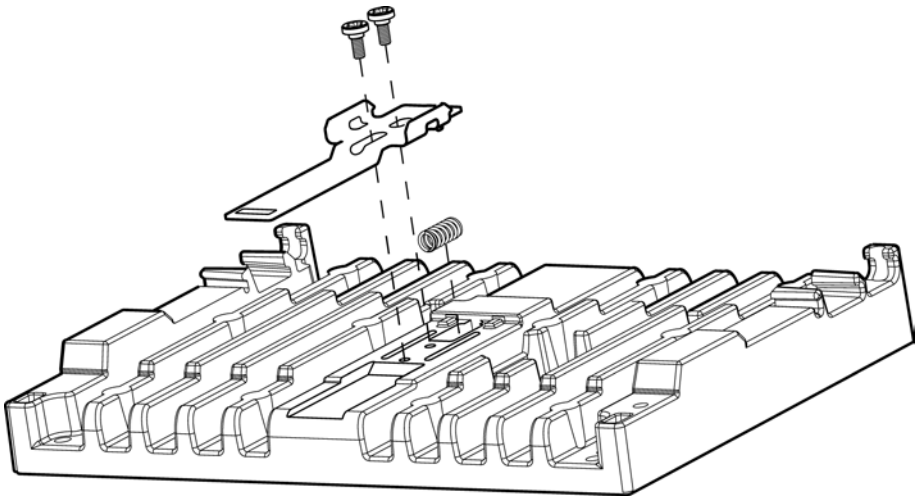


Figure 5-17 Mounting the DIN rail adapter

Follow the steps below to mount the RF290R reader on a DIN rail:

1. Place the device on the upper edge of the DIN rail (position A).
2. Pull the spring-mounted DIN rail slider (position B) down and press the device against the DIN rail until it locks in place.

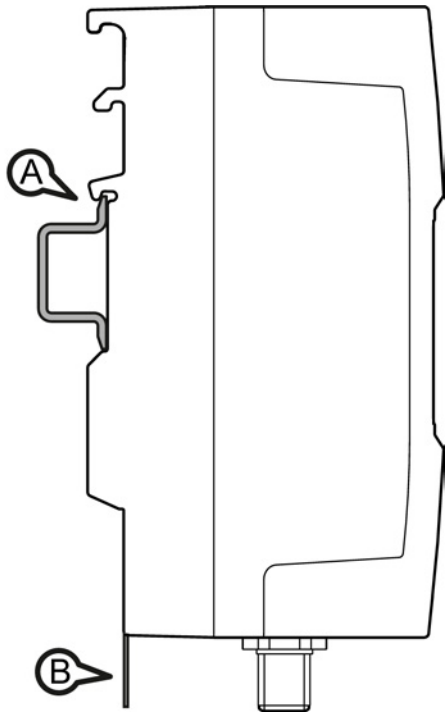


Figure 5-18 Mounting the RF290R reader on a DIN rail

5.6.6 Technical specifications of the RF290R reader

	6GT2821-0AC12
Product type designation	RF290R
Inductive interface to the transponder Transmission frequency for power/data	13.56 MHz
Transponders supported	Transponder to ISO 15693
Connectable antennas	ANT D5, D6, D10
Interface	
• Communications module	• RS-422 (3964R protocol)
• PC	• RS-232
Baud rate	19200, 57600, 115200 baud
Cable length reader ↔ communications module	RS-422: max. 1000 m RS-232: Max. 30 m (shielded cable)
Transmit power	up to 5 W
Multitag	only in PC mode (RS-232)
Read/write distances of reader	Refer to chapter Field data (Page 35)
Maximum data transmission rate reader ↔ transponder	
• Read	• approx. 1.5 KBps
• Write	• approx. 1.5 KBps
Power supply	24 VDC
Display elements	4 LEDs (Power, Active, Presence, Error)
Digital input / output	(only available in PC mode, RS-232)
• Digital input	• 1 x opto-coupler 24 V
• Digital output	• 1 x relay 24 V / 1 A
Connection	
• Power supply/data line	• M12, 8-pin, male
• Digital IN/OUT	• M12, 4-pin, female
• Antennas	• TNC, female
Housing	
• Dimensions (L × W × H)	• 200 × 140 × 80 mm (without device connector)
• Color	• Silver/anthracite
• Material	• Aluminum die-casting
Securing	M4 screws Tightening torque ≤ 1.5 Nm
Ambient temperature	
• During operation	• -20 °C ... +55 °C
• During transportation and storage	• -25 °C ... +85 °C

	6GT2821-0AC12
Degree of protection to EN 60529	IP65
Shock-resistant to EN 60 721-3-7, Class 7 M2	30 g
Vibration-resistant to EN 60 721-3-7, Class 7 M2	2 g
Weight	Approx. 1.8 kg
Approvals	Radio to R&TTE guidelines EN 300 330, EN 301489, CE FCC, IC, NTC (Thailand), KCC [1]
Current consumption	typ. 400 mA

[1] Use a power supply unit that meets the following requirements: 230 VAC, 24 VDC / 3 A; KC safety approved

5.6.7 Approvals

FCC information

Siemens SIMATIC RF290R (MLFB 6GT2821-0AC12) FCC ID NXW-RF290R

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) This device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d`Industrie Canada applicables aux appareils radio exempts de licence. L`exploitation est autorisée aux deux conditions suivantes :

(1) L`appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l`appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d`en compromettre le fonctionnement.

If the antenna is detachable, require the following two conditions:

(1) To reduce potential radio interference to other users, the antenna type should be chosen that the radiated power is not more than that permitted for successful communication.

(2) This device has been designed to operate with the antennas listed below. Antennas not included in this list are strictly prohibited for use with this device. The required antenna impedance is 50 Ω.

Si l'antenne est amovible, demandez les deux conditions suivantes :

(1) Afin de réduire le risque d'interférence aux autres utilisateurs, il faut choisir le type d'antenne et son gain de façon à ce que la puissance rayonnée ne soit pas supérieure au niveau requis pour l'obtention d'une communication satisfaisante.

(2) Ce dispositif a été conçu pour fonctionner avec les antennes énumérées ci-dessous. Les antennes non incluses dans cette liste sont strictement interdites pour l'exploitation de ce dispositif. L'impédance d'antenne requise est 50 Ω.

5.6.8 Note on the use of the RF290R as a replacement for SLG D10 / SLG D10S

The RF290R reader is the successor to the MOBY D readers SLG D10 / SLG D10S rounding off the RF200 family; it is operated with external antennas. The following features distinguish the RF290R from the SLG models:

Table 5- 5 Differences between the RF290R readers and SLG D10 / SLG D10S

Properties SLG D10/SLG D10S	Properties RF290R
Two devices with different interfaces	RS-232/RS-422 interface and PC/CM functionality in one device
M 12, 4-pin male connector for the power supply 9-pin D-sub male connector for connection to the various communications modules	M12, 8-pin male connector for the power supply and for direct connection to the various communications modules [1)]
no digital I/O	M12, 4-pin female connector for digital I/O (can only be used in PC mode)
no operating display via LEDs	operating display by four LEDs
Maximum transmit power of 10 W	Maximum transmit power of 5 W
One securing option	Different securing options
Standard protocol in ISO host mode (in PC mode)	Advanced protocol in ISO host mode (in PC mode) [2)]
Amplitude Shift Keying (ASK) and Frequency Shift Keying (FSK) modes possible	Amplitude Shift Keying (ASK) mode possible

Properties SLG D10/SLG D10S	Properties RF290R
Support of "ICode1" and "TagIt" and ISO 15693-compatible transponders	Support of ISO 15693-compatible transponders
The total memory for "repeat_command" is limited to 32 kB	The total memory for "repeat_command" is limited to 16 kB

1) The RF290R reader connectors are compatible with the SLG D10 if a Y connecting cable is used (6GT2891-4KH50, 6GT2891-4KH50-0AX0).

2) In ISO host mode (in PC mode), a program adaptation is necessary

5.6.9 Dimension drawing

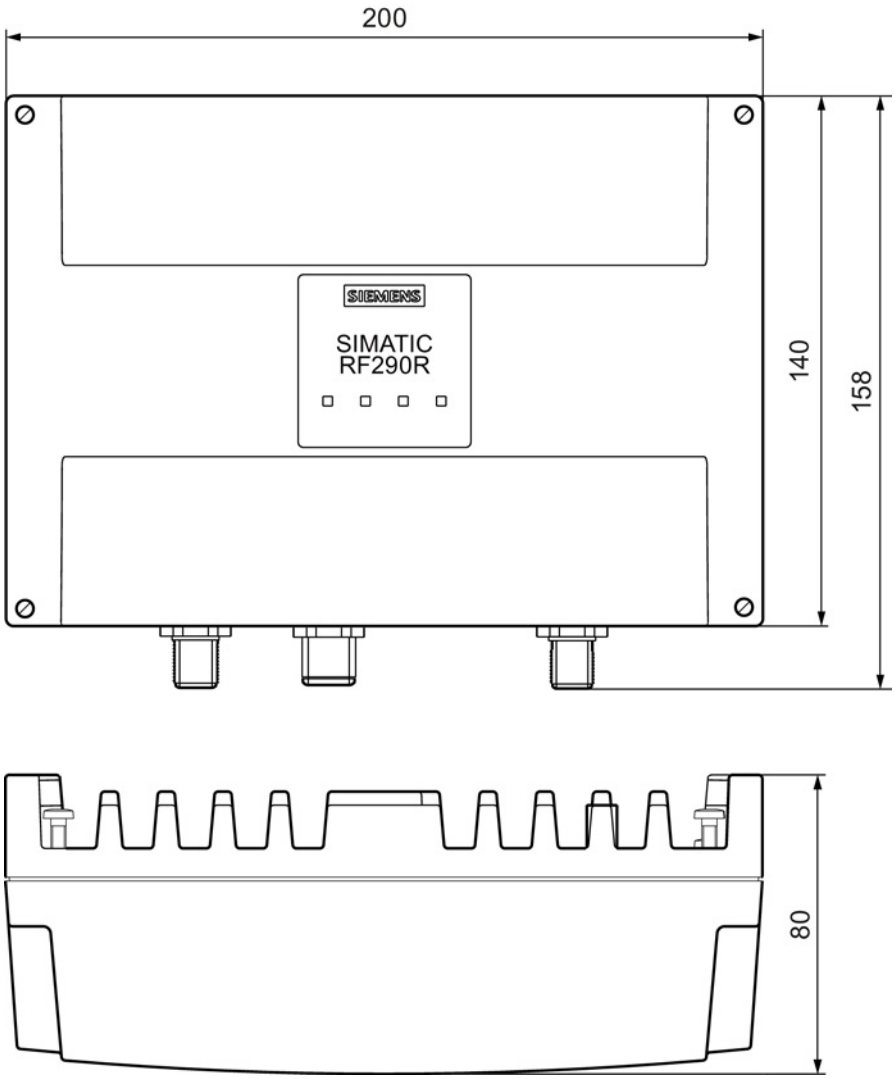


Figure 5-19 Dimensional drawing RF290R (dimensions in mm)

Antennas

6

Note

The RF250R and RF290R readers require external antennas

Note that the RF250R and RF290R readers are designed for operation with external antennas.

The RF250R reader can only be used in conjunction with the antennas ANT 8, 12, 18 or 30.
The RF290R reader can only be used in conjunction with the antennas ANT D5, D6 or D10.

6.1 ANT 8

6.1.1 Features

ANT 8	Characteristics	
	Area of application	Tool identification
	Writing/reading distance	up to 4 mm (depending on the transponder)
	Connecting cable	3 m
	Connectable readers	RF250R
	Degree of protection	IP67

6.1.2 Ordering data

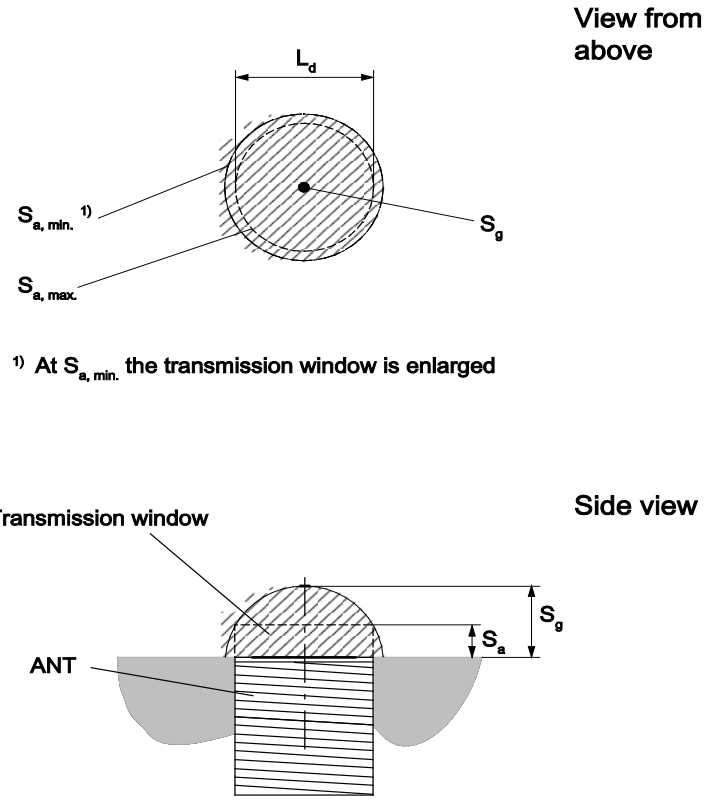
Table 6- 1 Ordering data ANT 8

Antenna	Article number
ANT 8 (incl. one antenna connecting cable 3 m)	6GT2398-1CF10
ANT 8 (without antenna cable)	6GT2398-1CF00

Table 6- 2 Ordering data ANT 8 accessories

Accessories	Article number
Antenna connecting cable with M8 plug (with angled plug)	6GT2391-0AH30

6.1.3 Transmission window



L_d Length of the transmission window (= 3 mm)

S_a Operating distance between antenna and transponder

S_g Limit distance (maximum clear distance between upper surface of the reader and the antenna, at which the transmission can still function under normal conditions)

Figure 6-1 Transmission window ANT 8

6.1.4 Flush-mounted in metal

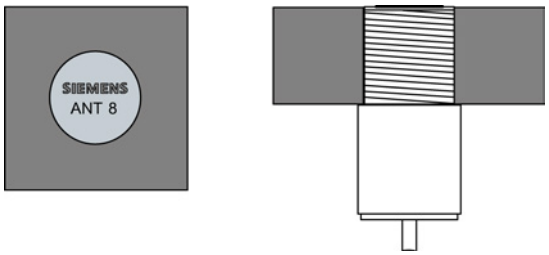


Figure 6-2 ANT 8 flush-mounted in metal

6.1.5 Minimum spacing

Note

Extension of the data transmission time if distance values are undershot

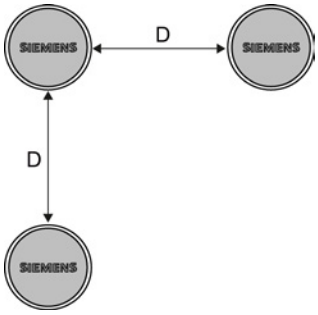
If the distance values specified in the tables are undershot, it is possible that the inductive fields will be affected. In this case, the data transmission time can increase unpredictably or a command is aborted with an error.

For this reason, please observe the values in the tables.

Minimum distances from transponder to transponder (without multitag mode)

	MDS D117 / MDS D127	MDS D421
RF250R with ANT 8	≥ 20 mm	≥ 30 mm

Definition of distance D



D > 30 mm (with 2 antennas)
> 30 mm (with 3 antennas)

Figure 6-3 Minimum distance for ANT 8

D > 50 mm

Figure 6-4 Face-to-face distance between two ANT 8s

6.1.6 Technical data

	6GT2398-1CC00
Product type designation	ANT 8
Max. write/read distance ANT - transponder (S_g)	4 mm
Dimensions (∅ × pitch × L)	M8 × 1.0 mm × 40 mm
Color	silver-metallic
Material	Stainless steel
Plug connection	4-pin (pins on antenna side)
Antenna cable length	3 m
Shock resistant according to EN 60721-3-7 Class 7M2 Total shock response spectrum Type II	50 g [1)]
Vibration resistance in accordance with EN 60721-3-7, Class 7M2	20 g (3 ... 500 Hz) [1)]
Attachment of the antenna	2 stainless steel nuts, M8 × 1.0 mm
Ambient temperature	
• During operation	• -25 °C ... +70 °C
• During transportation and storage	• -40 °C ... +85 °C
Degree of protection to EN 60529	IP67
Weight, approx.	45 g

1) Warning: The values for shock and vibration are maximum values and must not be applied continuously.

6.1.7 Dimension drawing

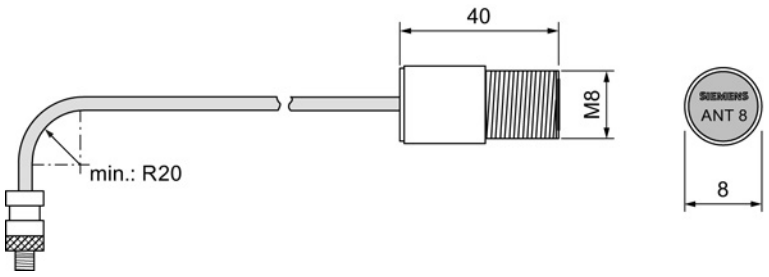


Figure 6-5 Dimension drawing ANT 8 (all values in mm)

6.2 ANT 12

6.2.1 Features

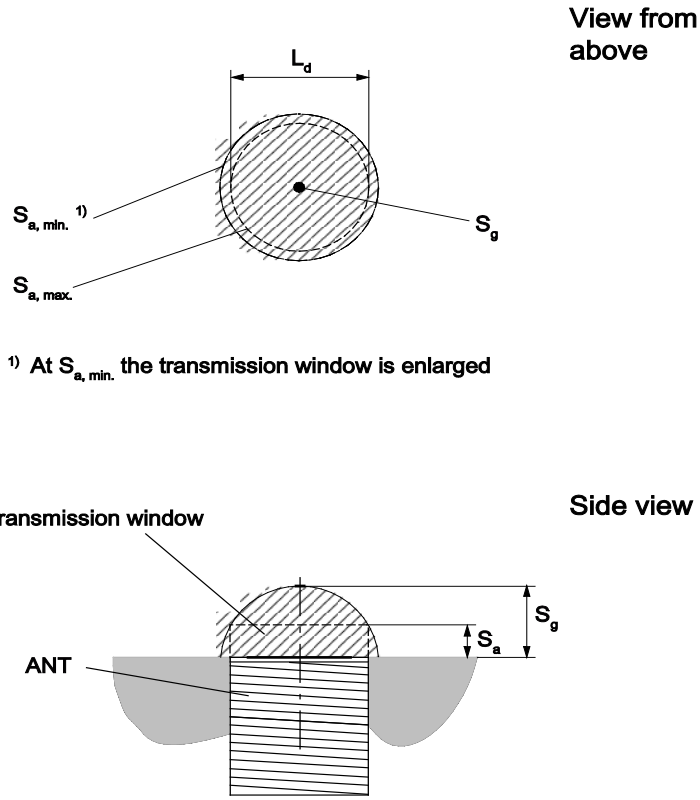
ANT 12	Characteristics	
	Area of application	Tool identification
	Writing/reading distance	up to 16 mm (depending on the transponder)
	Connecting cable	3 m
	Connectable readers	RF250R
	Degree of protection	IP67 (front)

6.2.2 Ordering data

Table 6- 3 Ordering data ANT 12

Antenna	Article number
ANT 12 (incl. one antenna connecting cable 3 m)	6GT2398-1CC00

6.2.3 Transmission window



L_d Length of the transmission window (= 20 mm)

S_a Operating distance between antenna and transponder

S_g Limit distance (maximum clear distance between upper surface of the reader and the antenna, at which the transmission can still function under normal conditions)

Figure 6-6 Transmission window ANT 12

6.2.4 Flush-mounted in metal

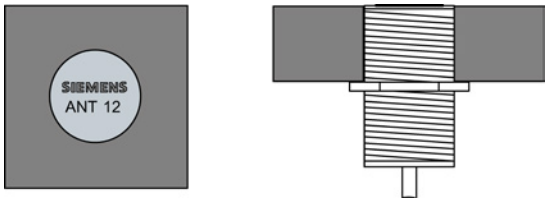


Figure 6-7 ANT 12 flush-mounted in metal

6.2.5 Minimum spacing

Note

Extension of the data transmission time if distance values are undershot

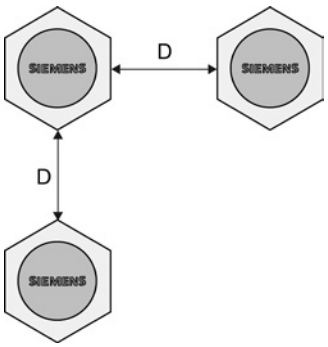
If the distance values specified in the tables are undershot, it is possible that the inductive fields will be affected. In this case, the data transmission time can increase unpredictably or a command is aborted with an error.

For this reason, please observe the values in the tables.

Minimum distances from transponder to transponder (without multitag mode)

	MDS D117 / MDS D127	MDS D421 / MDS D422 / MDS D428 / MDS D460
RF250R with ANT 12	≥ 60 mm	≥ 80 mm

Definition of distance D



D > 30 mm (with 2 antennas)
> 40 mm (with 3 antennas)

Figure 6-8 Minimum distance for ANT 12

D > 100 mm

Figure 6-9 Face-to-face distance between two ANT 12s

6.2.6 Technical data

	6GT2398-1CC00
Product type designation	ANT 12
Max. write/read distance ANT - transponder (S_g)	16 mm
Dimensions (∅ × pitch × L)	M12 × 1.0 mm × 40 mm
Color	Pale turquoise
Material	Plastic Crastin
Plug connection	4-pin (pins on antenna side)
Antenna cable length	3 m
Shock resistant according to EN 60721-3-7 Class 7M2 Total shock response spectrum Type II	50 g [1)]
Vibration resistance in accordance with EN 60721-3-7, Class 7M2	20 g (3 ... 500 Hz) [1)]
Attachment of the antenna	2 plastic nuts, M12 × 1.0 mm
Ambient temperature	
• During operation	• -20 °C ... +70 °C
• During transportation and storage	• -40 °C ... +85 °C
Degree of protection according to EN 60529	IP67 (front)
Weight, approx.	45 g

[1)] Warning: The values for shock and vibration are maximum values and must not be applied continuously.

6.2.7 Dimension drawing

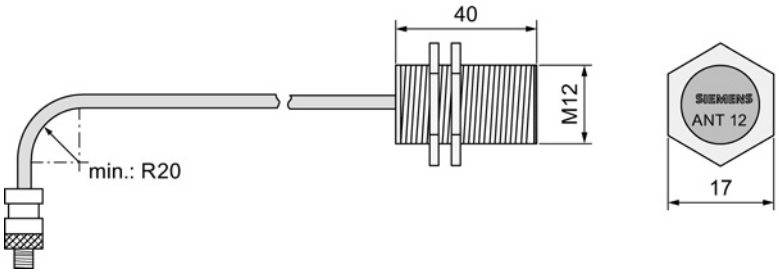


Figure 6-10 Dimension drawing ANT 12 (all values in mm)

6.3 ANT 18

6.3.1 Features

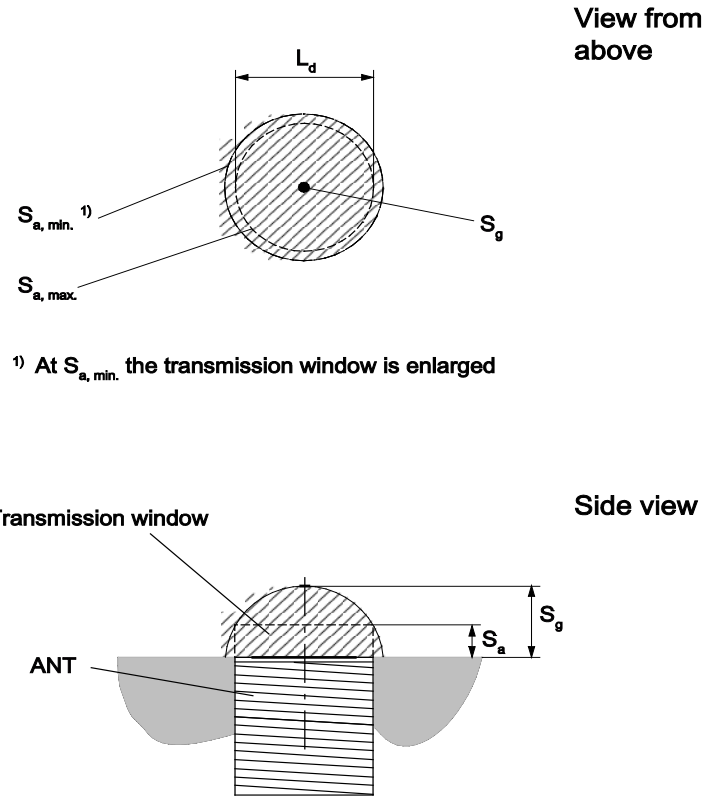
ANT 18	Characteristics	
	Area of application	Small assembly lines
	Writing/reading distance	up to 35 mm (depending on the transponder)
	Connecting cable	3 m
	Connectable readers	RF250R
	Degree of protection	IP67 (front)

6.3.2 Ordering data

Table 6- 4 Ordering data ANT 18

Antenna	Article number
ANT 18 (incl. one antenna connecting cable 3 m)	6GT2398-1CA00

6.3.3 Transmission window



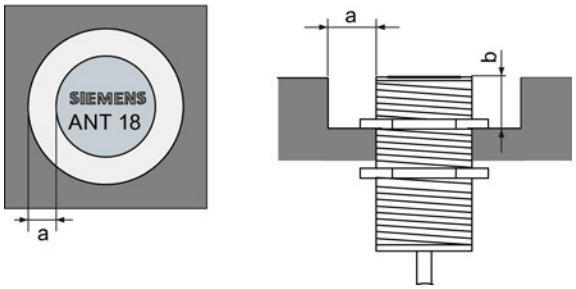
L_d Length of the transmission window (= 30 mm)

S_a Operating distance between antenna and transponder

S_g Limit distance (maximum clear distance between upper surface of the reader and the antenna, at which the transmission can still function under normal conditions)

Figure 6-11 Transmission window ANT 18

6.3.4 Flush-mounted in metal



a = 10 mm
b = 10 mm

Figure 6-12 ANT 18 flush-mounted in metal

6.3.5 Minimum spacing

Note

Extension of the data transmission time if distance values are undershot

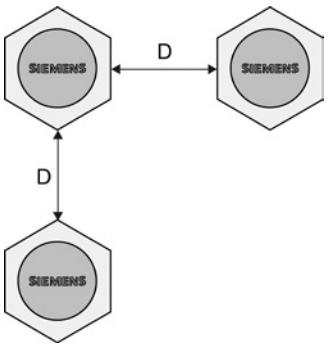
If the distance values specified in the tables are undershot, it is possible that the inductive fields will be affected. In this case, the data transmission time can increase unpredictably or a command is aborted with an error.

For this reason, please observe the values in the tables.

Minimum distances from transponder to transponder (without multitag mode)

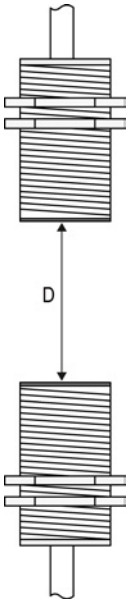
	MDS D124 / MDS D160 / MDS D324	MDS D421 / MDS D422 / MDS D423 / MDS D424 / MDS D425 / MDS D428 / MDS D460
RF250R with ANT 18	≥ 80 mm	≥ 100 mm

Definition of distance D



D > 30 mm (with 2 antennas)
> 40 mm (with 3 antennas)

Figure 6-13 Minimum distance for ANT 18



D > 100 mm

Figure 6-14 Face-to-face distance between two ANT 18s

6.3.6 Technical data

	6GT2398-1CC00
Product type designation	ANT 18
Max. write/read distance ANT - transponder (S_g)	35 mm
Dimensions (∅ × pitch × L)	M18 × 1.0 mm × 55 mm
Color	Pale turquoise
Material	Plastic Crastin
Plug connection	4-pin (pins on antenna side)
Antenna cable length	3 m
Shock resistant according to EN 60721-3-7 Class 7M2 Total shock response spectrum Type II	50 g [1)]
Vibration resistance in accordance with EN 60721-3-7, Class 7M2	20 g (3 ... 500 Hz) [1)]
Attachment of the antenna	2 plastic nuts, M18 × 1.0 mm
Ambient temperature	
• During operation	• -20 °C ... +70 °C
• During transportation and storage	• -40 °C ... +85 °C
Degree of protection according to EN 60529	IP67 (front)
Weight, approx.	120 g

1) Warning: The values for shock and vibration are maximum values and must not be applied continuously.

6.3.7 Dimension drawing

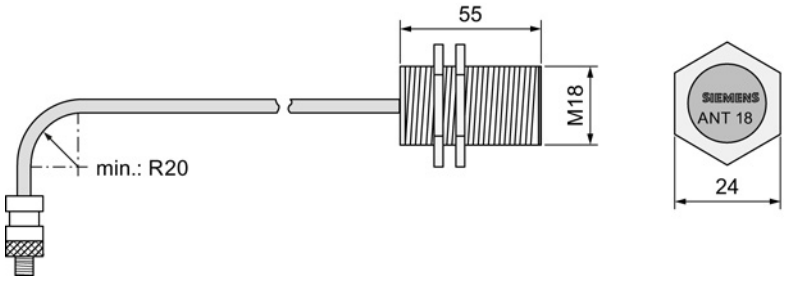


Figure 6-15 Dimension drawing ANT 18 (all values in mm)

6.4 ANT 30

6.4.1 Features

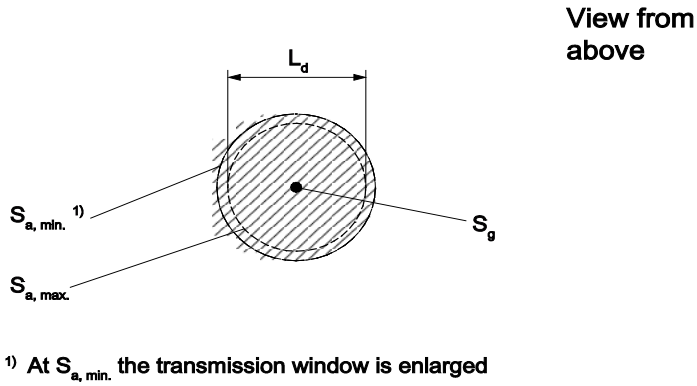
ANT 18	Characteristics	
	Area of application	Small assembly lines
	Writing/reading distance	up to 55 mm (depending on the transponder)
	Connecting cable	3 m
	Connectable readers	RF250R
	Degree of protection	IP67 (front)

6.4.2 Ordering data

Table 6- 5 Ordering data ANT 30

Antenna	Article number
ANT 30 (incl. one antenna connecting cable 3 m)	6GT2398-1CD00

6.4.3 Transmission window



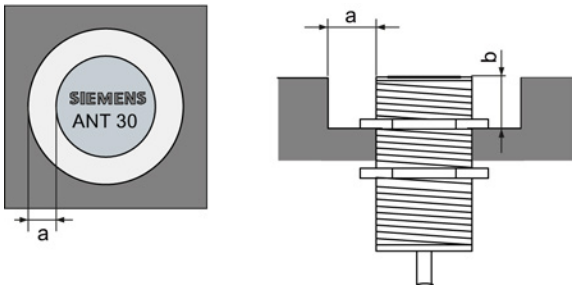
L_d Length of the transmission window (= 60 mm)

S_a Operating distance between antenna and transponder

S_g Limit distance (maximum clear distance between upper surface of the reader and the antenna, at which the transmission can still function under normal conditions)

Figure 6-16 Transmission window ANT 30

6.4.4 Flush-mounted in metal



a = 20 mm
b = 20 mm

Figure 6-17 ANT 30 flush-mounted in metal

6.4.5 Minimum spacing

Note

Extension of the data transmission time if distance values are undershot

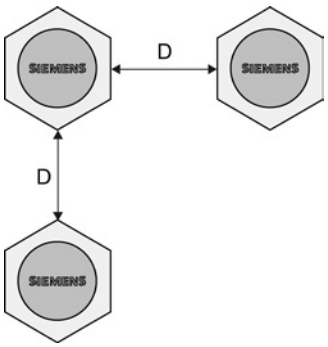
If the distance values specified in the tables are undershot, it is possible that the inductive fields will be affected. In this case, the data transmission time can increase unpredictably or a command is aborted with an error.

For this reason, please observe the values in the tables.

Minimum distances from transponder to transponder (without multitag mode)

	MDS D124 / MDS D160 / MDS D324 / MDS D423 / MDS D424 / MDS D460	MDS D422 / MDS D425 / MDS D428	MDS MDS D126 / MDS D426
RF250R with ANT 30	≥ 100 mm	≥ 80 mm	≥ 150 mm

Definition of distance D



D > 40 mm (with 2 antennas)
> 50 mm (with 3 antennas)

Figure 6-18 Minimum distance for ANT 30

D > 200 mm

Figure 6-19 Face-to-face distance between two ANT 30s

6.4.6 Technical data

	6GT2398-1CC00
Product type designation	ANT 30
Max. write/read distance ANT - transponder (S_g)	60 mm
Dimensions (∅ × pitch × L)	M30 × 1.0 mm × 58 mm
Color	Pale turquoise
Material	Plastic Crastin
Plug connection	4-pin (pins on antenna side)
Antenna cable length	3 m
Shock resistant according to EN 60721-3-7 Class 7M2 Total shock response spectrum Type II	50 g [1]
Vibration resistance in accordance with EN 60721-3-7, Class 7M2	20 g (3 ... 500 Hz) [1]
Attachment of the antenna	2 plastic nuts, M30 × 1.0 mm
Ambient temperature	
• During operation	• -20 °C ... +70 °C
• During transportation and storage	• -40 °C ... +85 °C
Degree of protection to EN 60529	IP67 (front)
Weight, approx.	150 g

[1] Warning: The values for shock and vibration are maximum values and must not be applied continuously.

6.4.7 Dimension drawing

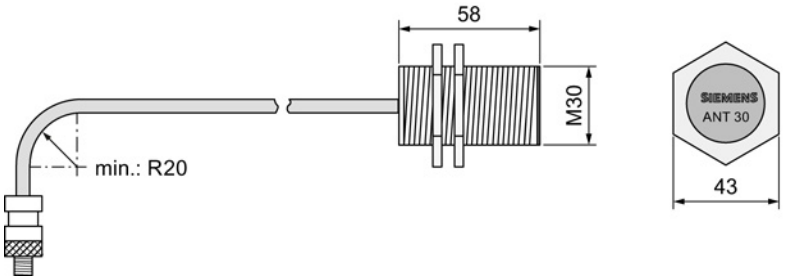
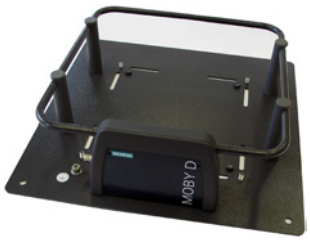


Figure 6-20 Dimension drawing ANT 30 (all values in mm)

6.5 ANT D5

6.5.1 Features

ANT D5	Characteristics	
	Area of application	Storage, logistics and distribution
	Writing/reading distance	up to 500 mm (depending on the transponder)
	Connecting cable	3.3 m
	Readers that can be connected	RF290R
	Degree of protection	IP65

6.5.2 Ordering data

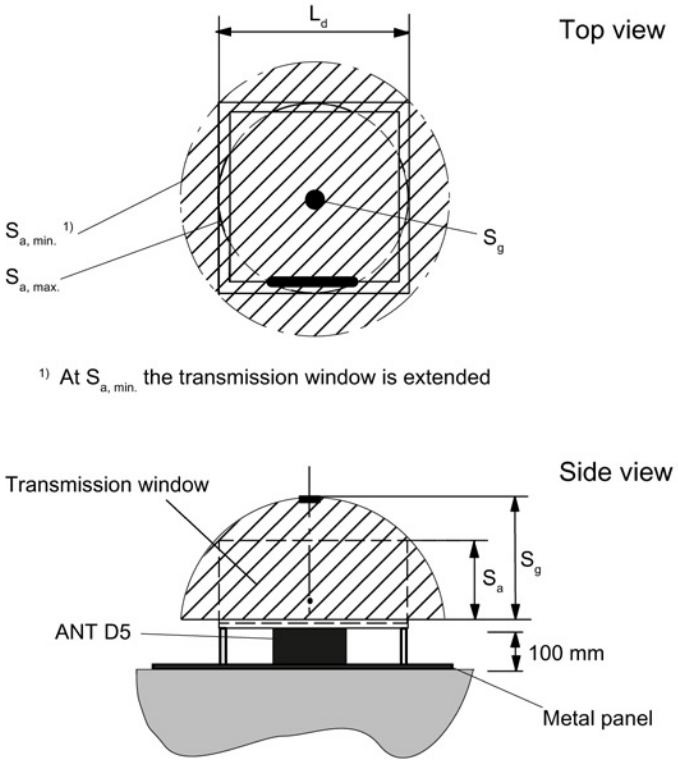
Table 6- 6 Ordering data of ANT D5

Antenna	Article number
ANT D5 (incl. one antenna connecting cable 3.3 m)	6GT2698-5AA10

Table 6- 7 Ordering data of ANT D5 accessories

Accessories		Article number
Antenna splitter (incl. one antenna connecting cable 3.3 m)		6GT2690-0AC00
Antenna multiplexer (incl. one antenna connecting cable 0.4 m)		6GT2894-0EA00
Antenna cable	Length 3.3 m	6GT2691-0CH33
	Length 10.5 m	6GT2691-0CN10
Antenna extension cable, length 7.2 m		6GT2691-0DH72

6.5.3 Transmission window



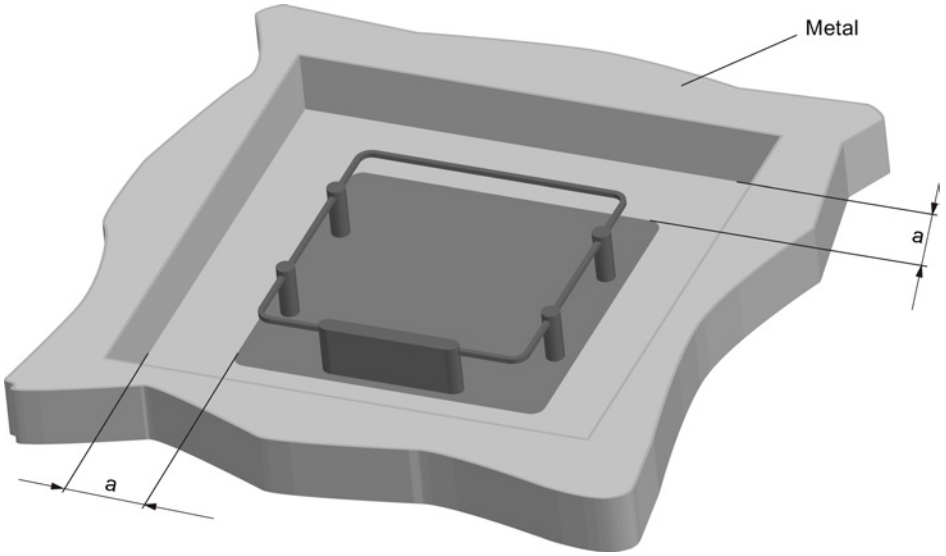
L_d Length of the transmission window (= 300 mm)

S_a Operating distance between antenna and transponder

S_g Limit distance (maximum clear distance between upper surface of the reader and the antenna, at which the transmission can still function under normal conditions)

Figure 6-21 Transmission window for ANT D5

6.5.4 Flush-mounted in metal



a = 150 mm

Figure 6-22 Metal-free area for ANT D5

6.5.5 Minimum spacing

Note

Extension of the data transmission time if distance values are undershot

If the distance values specified in the tables are undershot, it is possible that the inductive fields will be affected. In this case, the data transmission time can increase unpredictably or a command is aborted with an error.

For this reason, please observe the values in the tables.

Minimum distances from transponder to transponder (without multitag mode)

	MDS D100 / MDS D126 / MDS D139 / MDS D165 / MDS D200 / MDS D261 / MDS D339 / MDS D400 / MDS D426	MDS D124 / MDS D160 / MDS D324 / MDS D424 / MDS D428 / MDS D460
RF290R	≥ 1 m	≥ 0.8 m

Minimum distances from antenna to antenna

	RF290R with ANT D5	RF290R with ANT D6	RF290R with ANT D10
RF290R with ANT D5	≥ 2 m	≥ 2 m	≥ 2 m
RF290R with ANT D6	≥ 2 m	≥ 2 m	≥ 2 m
RF290R with ANT D10	≥ 2 m	≥ 2 m	≥ 2 m

Definition of distance D

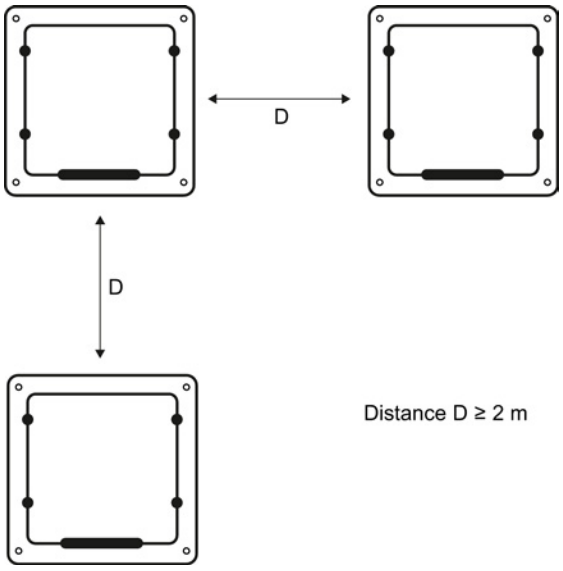


Figure 6-23 Distance D: ANT D5

6.5.6 Technical data

Technical specifications	
Max. write/read distance ANT to MDS (S_g)	500 mm
Dimensions (L x W x H)	380 x 380 x 110 mm
Color	gray/black
Material	Aluminum/plastic
Plug connection	1-pin TNC connector
Max. power	10 W (FCC/IC: 4 W)
Antenna cable length	3.3 m
Shock resistant according to EN 60721-3-7 Class 7M2 Total shock response spectrum Type II	30 g
Vibration according to EN 60721-3-7 Class 7M2	1 g (9 to 200 Hz) / 1.5 g (200 to 500 Hz)
Attachment of the antenna	4 M6 or alternatively M8 screws
Ambient temperature	
• During operation	• -20 °C ... +55 °C
• During transportation and storage	• -25 °C ... +70 °C
MTBF	10^7 hours
Degree of protection according to EN 60529	IP65 (UL: for indoor use only)
Weight, approx.	1.2 kg
Approvals	CE FCC, IC (as of 04/2013)

6.5.7 Dimension drawing

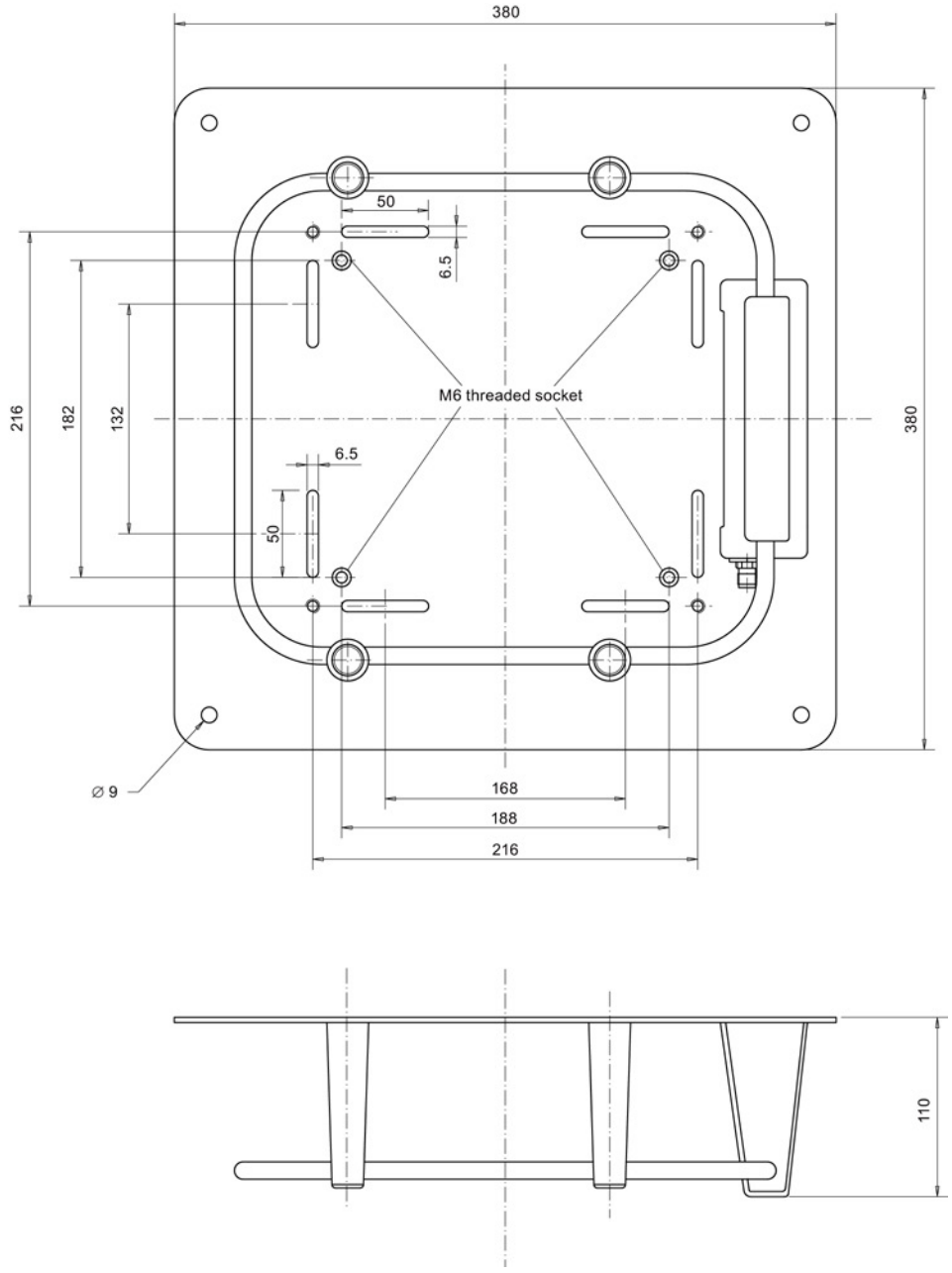


Figure 6-24 Dimension drawing for ANT D5

6.6 ANT D6

6.6.1 Features

ANT D6	Characteristics	
ANT D6 Covering hood	Area of application	• Storage, logistics and distribution • Suitable for high-speed applications with large writing/reading distance
	Writing/reading distance	up to 650 mm (depending on the transponder)
	Connecting cable	3.3 m; included in scope of supply
	Cover	Available as accessory
	Readers that can be connected	RF290R
	Degree of protection	IP65 (also without cover)

6.6.2 Ordering data

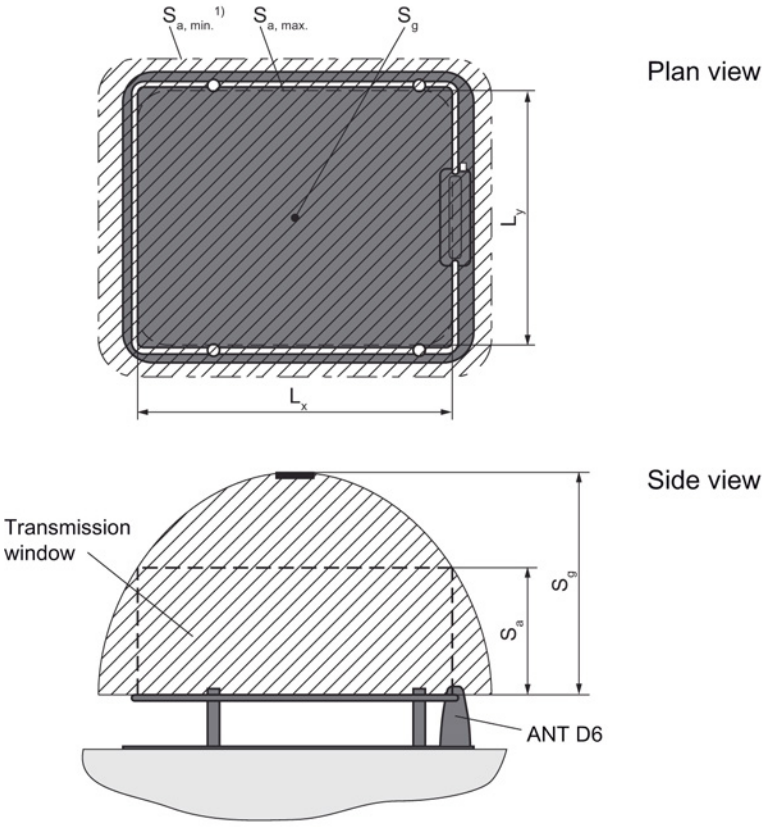
Table 6- 8 ANT D6 ordering data

Antenna	Article number
ANT D6 (without cover, incl. one antenna connecting cable 3.3 m)	6GT2698-5AB00

Table 6- 9 Ordering data for ANT D6 accessories

Accessories		Article number
Covering hood for ANT D6		6GT2690-0AD00
Antenna splitter (incl. one antenna connecting cable 3.3 m)		6GT2690-0AC00
Antenna multiplexer (incl. one antenna connecting cable 0.4 m)		6GT2894-0EA00
Antenna cable	Length 3.3 m	6GT2691-0CH33
	Length 10.5 m	6GT2691-0CN10
Antenna extension cable, length 7.2 m		6GT2691-0DH72

6.6.3 Transmission window



1) For $S_{a, min.}$, the transmission window is extended

L_x = 520 mm

L_y = 420 mm

Figure 6-25 Transmission window for ANT D6

6.6.4 Metal-free area

Flush-mounted in metal

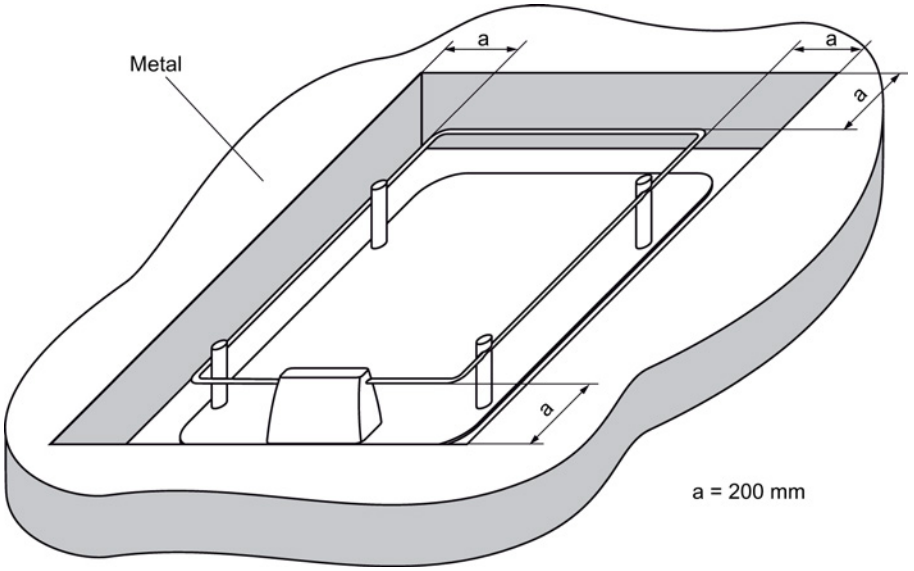


Figure 6-26 Metal-free area for ANT D6

6.6.5 Minimum spacing

Definition of distance D

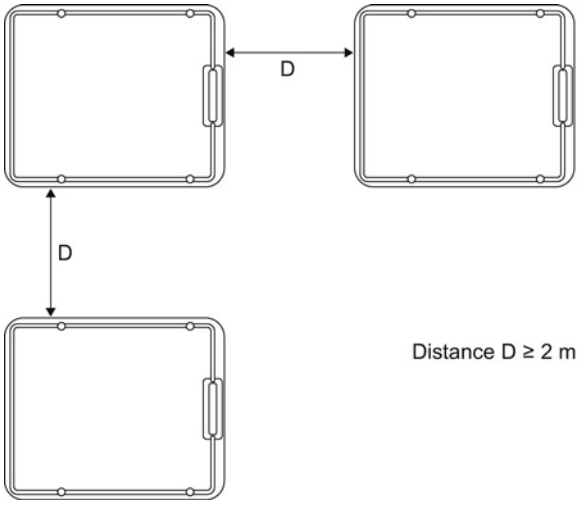


Figure 6-27 Distance D: ANT D6

6.6.6 Technical data

Technical specifications	
Max. write/read distance ANT to MDS (S_g)	650 mm
Dimensions (L x W x H)	580 x 480 x 110 mm (without cover)
Color	gray/black
Material	Aluminum/plastic
Plug connection	1-pin TNC connector
Max. power	10 W (FCC/IC: 2.5 W)
Antenna cable length	3.3 m
Shock resistant according to EN 60721-3-7 Class 7M2 Total shock response spectrum Type II	30 g
Vibration according to EN 60721-3-7 Class 7M2	1 g (9 to 200 Hz) / 1.5 g (200 to 500 Hz)
Attachment of the antenna	4 x M6 screws
Ambient temperature	
• During operation	• -20 °C ... +55 °C
• During transportation and storage	• -25 °C ... +70 °C
MTBF	3 x 10 ^{5} hours
Degree of protection according to EN 60529	IP65 (UL: for indoor use only)
Weight, approx.	3.3 kg
Approvals	CE FCC, IC (as of 04/2013)

6.6.7 Dimensional diagram

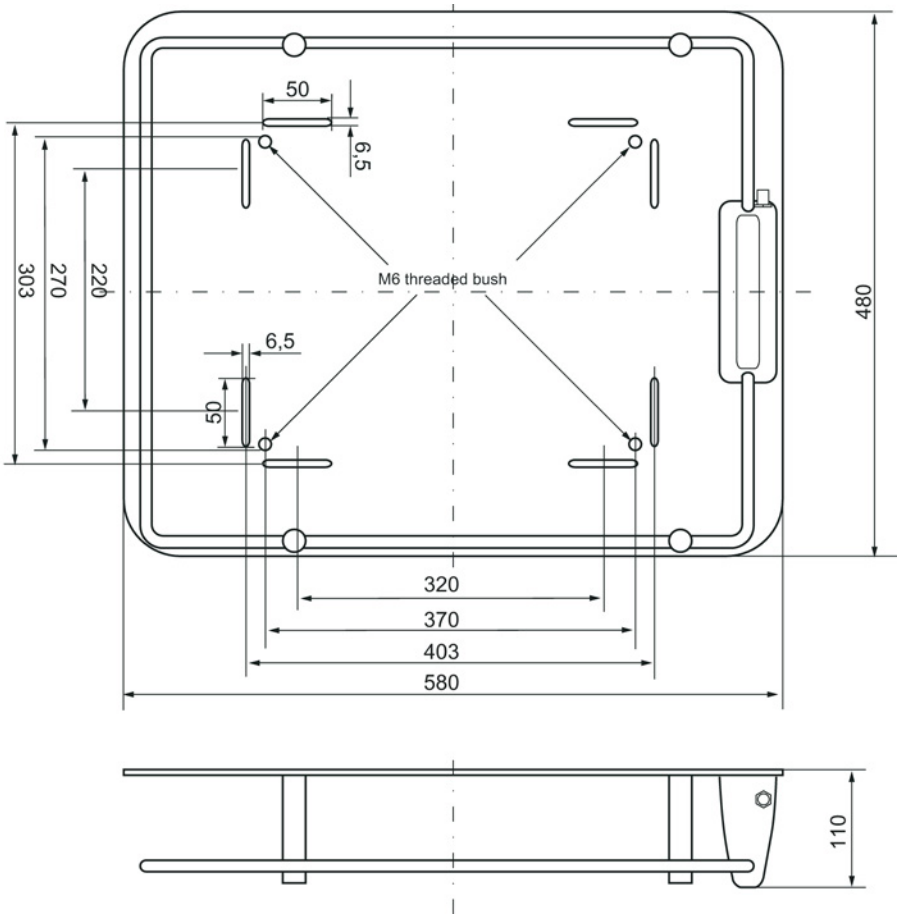


Figure 6-28 Dimension drawing for ANT D6

6.7 ANT D10

6.7.1 Features

ANT D10	Characteristics	
	Area of application	• Storage, logistics and distribution, e.g. clothing industry, laundries • Particularly when small MDS are used (e.g. MDS D124, MDS D160) and when there is a long transmission field
	Writing/reading distance	up to 480 mm (depending on the transponder)
	Connecting cable	3.3 m; included in scope of supply
	Cover	Included in scope of supply
	Readers that can be connected	RF290R

6.7.2 Ordering data

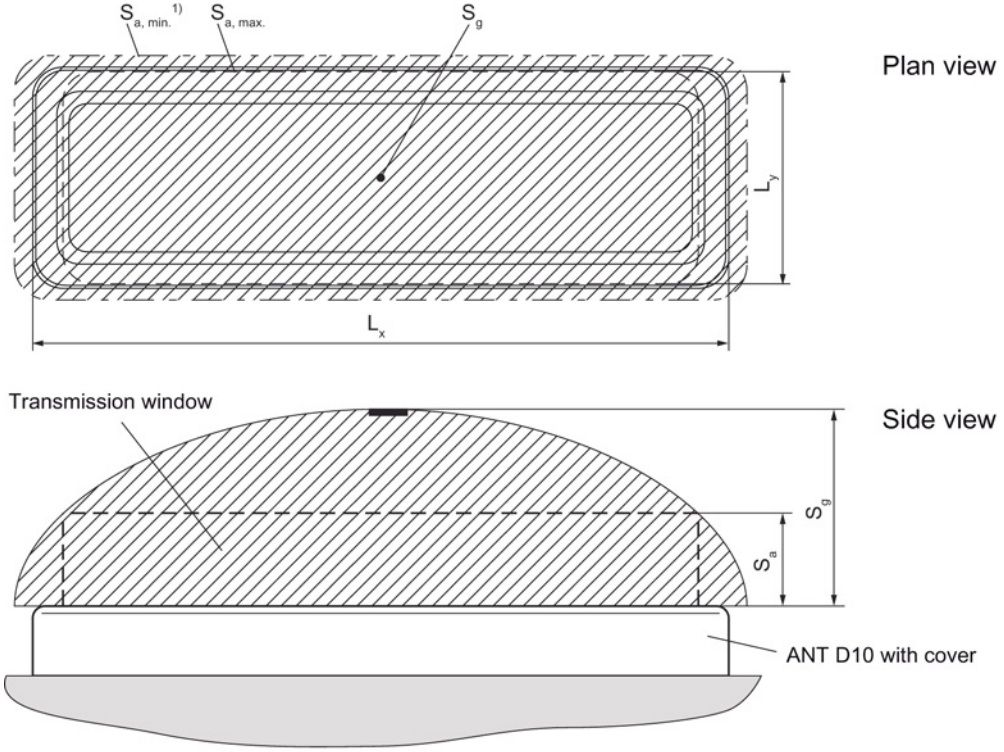
Table 6- 10 Ordering data of ANT D10

Antenna	Article number
ANT D10 (incl. cover and one antenna connecting cable 3.3 m)	6GT2698-5AF00

Table 6- 11 Ordering data of ANT D10 accessories

Accessories		Article number
Antenna splitter (incl. one antenna connecting cable 3.3 m)		6GT2690-0AC00
Antenna multiplexer (incl. one antenna connecting cable 0.4 m)		6GT2894-0EA00
Antenna cable	Length 3.3 m	6GT2691-0CH33
	Length 10.5 m	6GT2691-0CN10
Antenna extension cable, length 7.2 m		6GT2691-0DH72

6.7.3 Transmission window



1) For $S_{a, min.}$ the transmission window is extended

L_x 1050 mm

L_y 350 mm

Figure 6-29 Transmission window for ANT D10

6.7.4 Metal-free area

Flush-mounted in metal

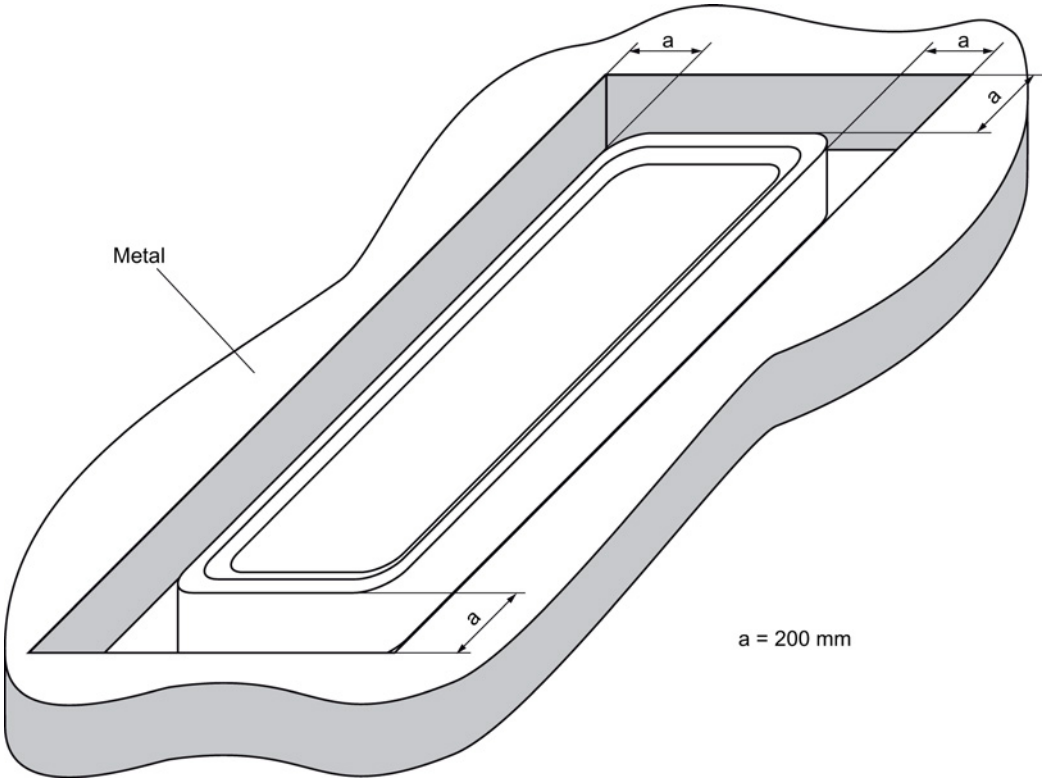


Figure 6-30 Metal-free area for ANT D10

6.7.5 Minimum spacing

Definition of distance D

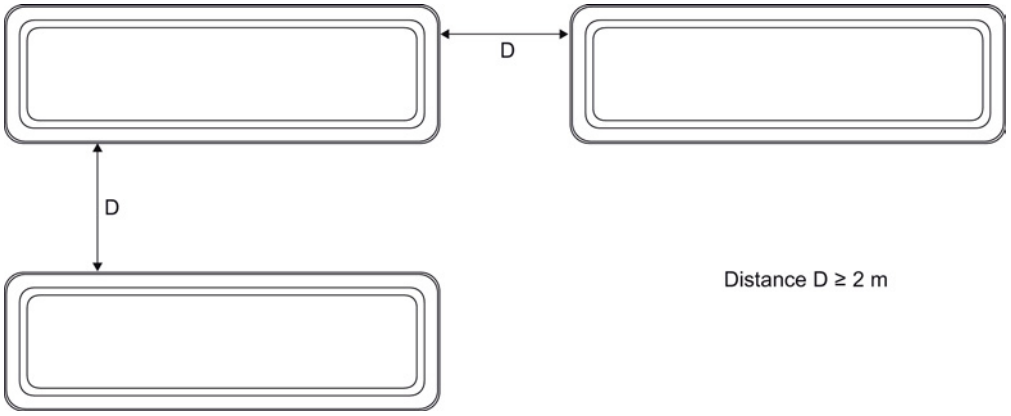


Figure 6-31 Distance D: ANT D10

6.7.6 Technical data

Technical specifications	
Max. write/read distance ANT to MDS (S_g)	480 mm
Dimensions (L x W x H)	1150 x 365 x 115 mm (with cover)
Color	gray/black
Material	Aluminum/plastic
Plug connection	1-pin TNC connector
Max. power	10 W (FCC/IC: 2.5 W)
Antenna cable length	3.3 m
Shock resistant according to EN 60721-3-7 Class 7M2 Total shock response spectrum Type II	30 g
Vibration according to EN 60721-3-7 Class 7M2	1 g (9 to 200 Hz) / 1.5 g (200 to 500 Hz)
Attachment of the antenna	4 x M6 screws
Ambient temperature	
• During operation	• -20 °C ... +55 °C
• During transportation and storage	• -25 °C ... +70 °C
MTBF	3 x 10^5 hours
Degree of protection according to EN 60529	IP65 (UL: for indoor use only)
Weight, approx.	10 kg (with cover)
Approvals	CE FCC, IC (as of 04/2013)

6.7.7 Dimensional diagram

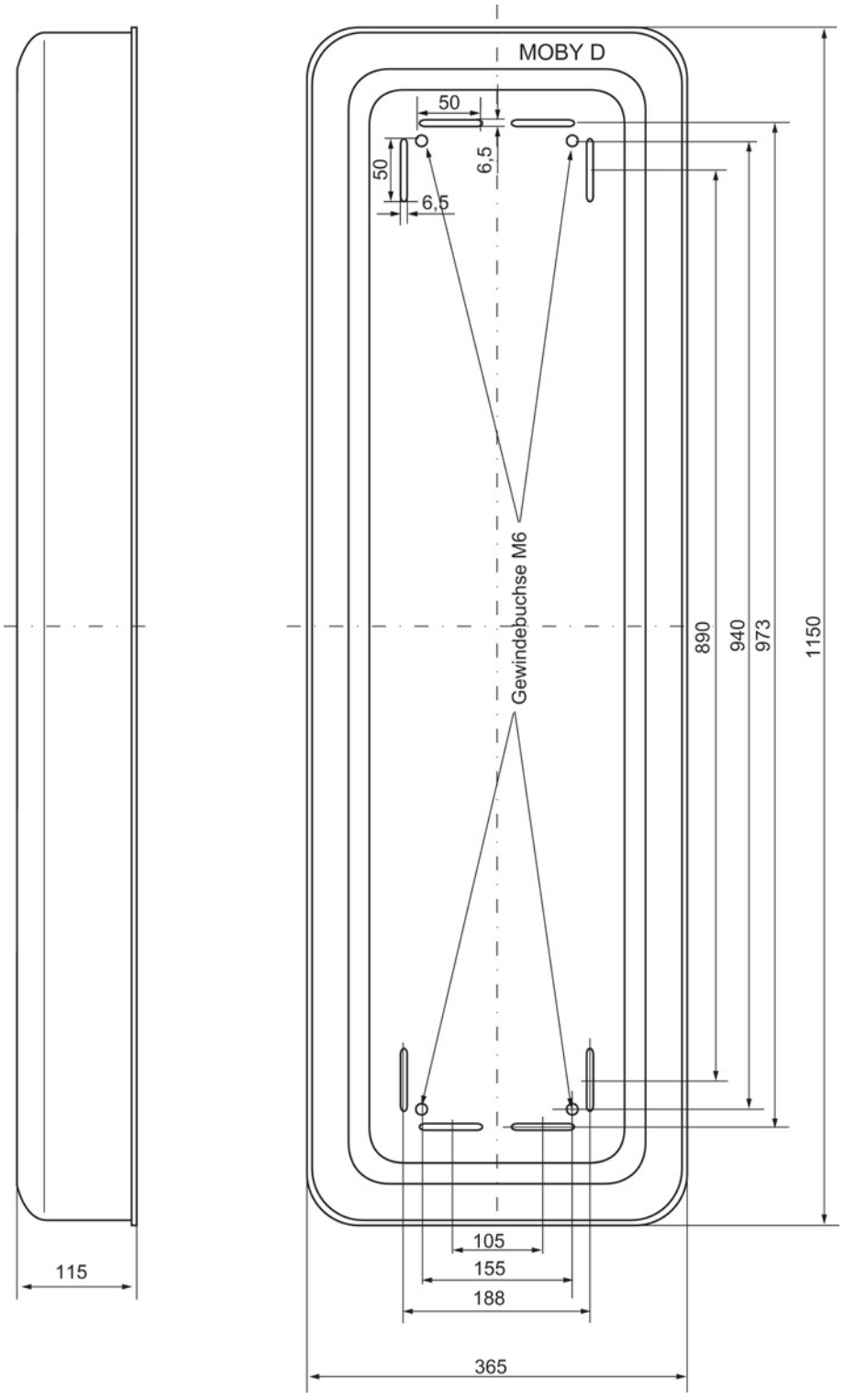


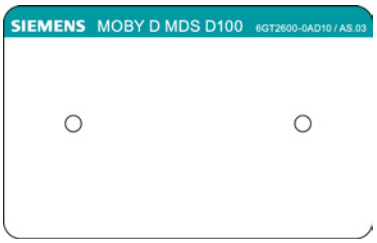
Figure 6-32 Dimension drawing for ANT D10

Transponder

7

7.1 MDS D100

7.1.1 Characteristics

MDS D100	Characteristics	
	Field of application	From simple identification such as electronic barcode replacement/supplementation, through warehouse and distribution logistics, right up to product identification.
	Memory	EEPROM 128 bytes gross 112 bytes net capacity
	Read/write range	See Chapter Field data (Page 35).
	Mounting on metal	Not possible; recommended distance from metal ≥ 20 mm
	ISO standard	ISO 15693

7.1.2 Ordering data

Table 7- 1 Ordering data for MDS D100

	Order number
MDS D100	6GT2600-0AD10

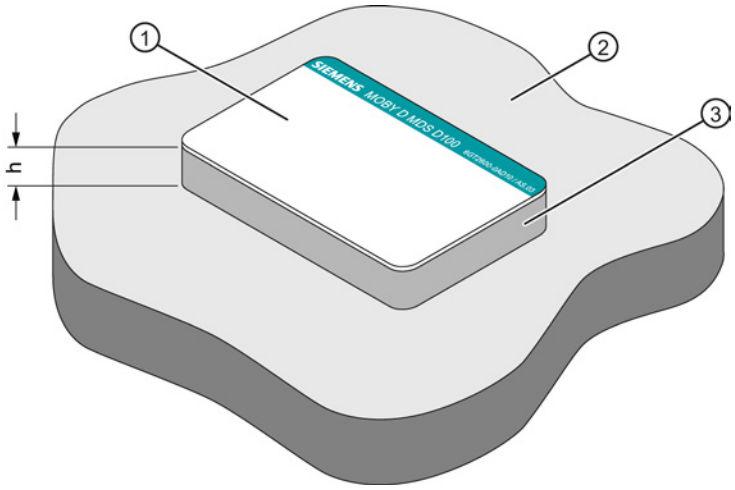
Table 7- 2 Ordering data for MDS D100 accessory

MDS D100 accessory	Order number
Spacer	6GT2190-0AA00
Holder	6GT2190-0AB00
Holder (cannot be mounted directly on metal)	6GT2390-0AA00

7.1.3 Metal-free area

Direct mounting of the MDS D100 on metal is not allowed. A distance of ≥ 20 mm is recommended. This can be achieved using the spacer 6GT2190-0AA00 in combination with the fixing pocket 6GT2190-0AB00.

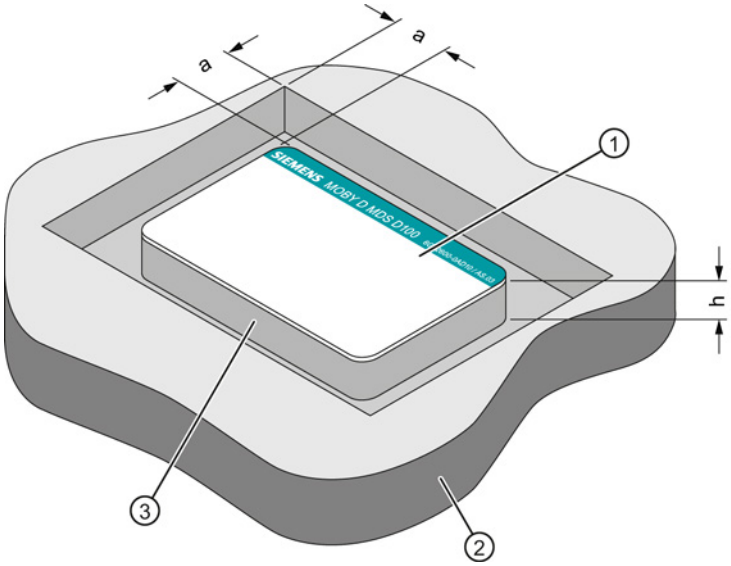
Mounting on metal



h ≥ 20 mm
① Data memory
② Metal
③ Non-metal

Figure 7-1 Mounting of the MDS D100 on metal with spacer

Flush-mounting



a ≥ 20 mm
h ≥ 20 mm
① Data memory
② Metal
③ Non-metal

Figure 7-2 Flush-mounting of MDS D100 in metal with spacer

Note

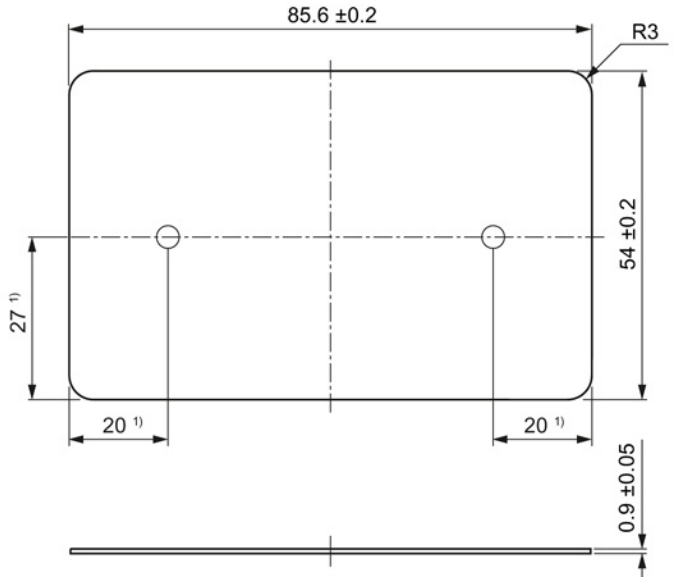
If the minimum guide values (h) are not observed, a reduction of the field data results.

7.1.4 Technical data

Table 7- 3 Technical data for MDS D100

Memory size	128 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 8 bytes
• Application memory	• 112 bytes
Storage technology	EEPROM
Memory organization	EEPROM 128 bytes gross 112 bytes net capacity When using the OPT area, 16 bytes of it must be subtracted in 4 byte blocks
Protocol	according to ISO 15693
Data retention (at +40 °C)	10 years
MTBF (at +40 °C)	2 x 10^6 hours
Read cycles	Unlimited
Write cycles, typical	1 000 000
Write cycles, min.	100 000
Read/write distance (S_g)	See Chapter Field data (Page 35).
Distance from metal	min. 20 mm (approx. 30% reduction of the field data)
Multitag capability	Yes
Power supply	Inductive power transmission (without battery)
Degree of protection to EN 60529	IP68
Vibration	ISO 10373/ISO 7810
Torsion and bending load	ISO 10373/ISO 7816-1
Mechanical design	Laminated plastic card, printable on both sides
• Color	• White/petrol
• Material	• PC
• Dimensions (L x W x H) in mm	• 85.6 (±0.2) x 54 (±0.2) x 0.9 (±0.05)
Fixing	Adhesive, fixing pocket
Ambient temperature	
• During operation	• -25 °C to +80 °C
• Transport and storage	• -25 °C to +80 °C
Weight, approx.	5 g

7.1.5 Dimension drawing



Dimensions in mm

1) Dimensions for mounting holes

Figure 7-3 MDS D100 dimension drawing

7.2 MDS D117

7.2.1 Features

MDS D117	Characteristics	
	Area of application	Very compact data carrier that can be screwed into areas where precise positioning is necessary; e.g. tool identification, workpiece holders etc.
	Memory	128 bytes EEPROM/gross 112 bytes user memory
	Read/write range	See chapter "Field data (Page 35)."
	Mounting in metal	Flush mounted
	ISO standard	ISO 15693

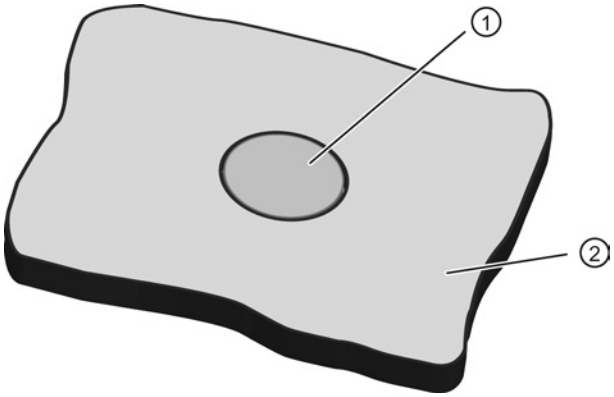
7.2.2 Ordering data

Table 7- 4 Ordering data for MDS D117

Transponder	Order number
MDS D117 Pack of 10	6GT2600-0AG00

7.2.3 Mounting in metal

Flush-mounted in metal



① Transponder
② Metal

7.2.4 Technical specifications

	6GT2600-0AG00
Product type designation	MDS D117
Memory size	128 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 8 bytes
• Application memory	• 112 bytes
Storage technology	EEPROM
Memory organization	Refer to the RF200 or RF300 system manual, section "Memory configuration of the ISO tags"
Data retention (at +40 °C)	10 years
MTBF (at +40 °C)	≥ 2 x 10^6 hours
Read cycles	unlimited
Write cycles (at +40 °C)	
• minimum	• 100 000
• Typical	• 1 000 000
Read/write distance (S_g)	See section "Field data (Page 35)."
Multitag capability	Yes
Power supply	inductive power transmission (without battery)
Degree of protection according to EN 60529	IP68 [1]
Degree of protection according to DIN 40050 Part 9	IPx9K [2]
Shock according to EN 60721-3-7, Class 7M3 Total shock response spectrum, Type II	100 g [3]
Vibration-resistant to EN 60721-3-7, Class 7M3	20 g [3]
Torsion and bending load	not permitted
Housing	
• Dimensions (D x H)	• 4 mm (+0.2) × 5.2 mm (+0.3)
• Color	• Black
• Material	• Plastic PPS
Securing	Cement in
Ambient temperature	
• During operation	• -25 ... +85 °C
• During transportation and storage	• -40 ... +100 °C
Weight	Approx. 1 g

[1] 2 hours, 2 m, +20 °C

[2] steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C

[3] The values for shock and vibration are maximum values and must not be applied continuously.

7.2.5 Dimension drawing

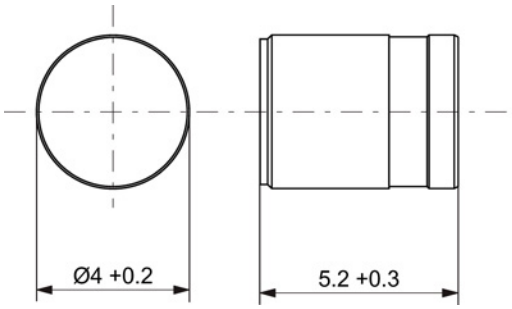


Figure 7-4 Dimensions in mm

7.3 MDS D124

7.3.1 Characteristics

MDS D124	Characteristics	
	Field of application	Application areas in production automation (e.g. small paintshops up to +180 °C)
	Memory	128 bytes EEPROM/gross 112 bytes user memory
	Read/write range	See section "Field data (Page 35)".
	Mounting on metal	With spacer: Recommended distance from metal ≥ 15 mm
	ISO standard	ISO 15693
	Degree of protection	IP68, IPx9K
	Material	Plastic PPS, silicone-free

7.3.2 Ordering data

Table 7- 5 Ordering data for MDS D124

	Order number
MDS D124	6GT2600-0AC10

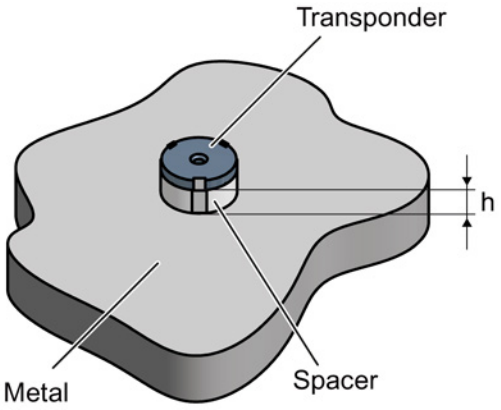
Table 7- 6 Ordering data for MDS D124 accessories

	Order number
Spacer	6GT2690-0AK00

7.3.3 Mounting on metal

Mounting on metal

Direct mounting of the MDS D124 on metal is not possible. A distance of ≥ 15 mm is recommended. This can be achieved by mounting the transponder on a spacer, (see section "Ordering data (Page 269)").

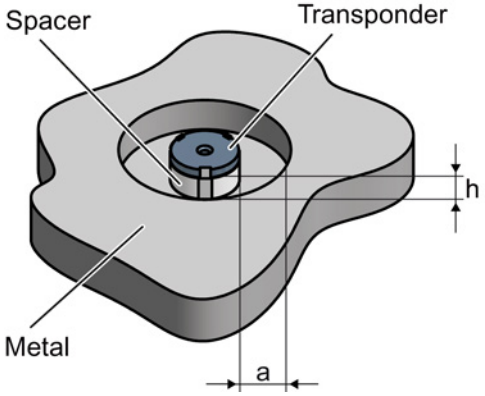


h ≥ 15 mm

Figure 7-5 Mounting of the MDS D124 on metal with spacer

Flush-mounted in metal

It is possible to mount the MDS D124 in metal. However, with large antennas (for example ANT D5) this leads to a reduction of the ranges.



h ≥ 15 mm

a ≥ 25 mm

Figure 7-6 Flush-mounting of MDS D124 in metal with spacer

7.3.4 Technical specifications

Table 7- 7 Technical data for MDS D124

Memory size	128 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 8 bytes
• Application memory	• 112 bytes
Storage technology	EEPROM
Memory organization	Refer to the MOBY D system manual, RF200 or RF300 section "Memory configuration of the ISO tags"
Data retention (at +40 °C)	10 years
MTBF (at +40 °C)	≥ 2 x 10^6 hours
Read cycles	Unlimited
Write cycles (at +40 °C)	
• minimum	• 100 000
• Typical	• 1 000 000
Read/write distance (S_g)	See section "Field data (Page 35)."
Distance from metal	at least 15 mm (approx. 30% reduction of the field data)
Multitag capability	Yes
Maximum reader power in hazardous area	2 W
Maximum field strength for operation in hazardous area	5 A / m
Power supply	Inductive power transmission (without battery)
Degree of protection to EN 60529	IP68 [1] IPx9K [2]
Shock according to EN 60721-3-7, Class 7M3 Total shock response spectrum, Type II	100 g [3]
Vibration-resistant to EN 60721-3-7, Class 7M3	20 g [3]
Torsion and bending load	Not permissible
Enclosure	
• Dimensions (D x H)	• 27 x 4 mm (±0.2 mm)
• Color	• Black
• Material	• Plastic PPS, silicone-free
Fixing	Adhesive, M3 screw, snap-in (spacer)
Tightening torque	≤ 1 Nm

Ambient temperature	During operation	-25 ... +100 ℃	Permanent
		+120 ... +140 ℃	20% reduction in the limit distance
		+200 ℃ [4]	Tested up to 5000 hours or 3000 cycles
		+220 ℃ [4]	Tested up to 2000 hours or 1500 cycles
	Transport and storage	-40 ... +100 ℃	
Weight		approx. 50 g	

[1] 2 hours, 2 m, +20 °C

[2] steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C

[3] The values for shock and vibration are maximum values and must not be applied continuously.

[4] Note that processing is not possible at temperatures of +140 °C or higher.

7.3.5 Use of the MDS D124 in hazardous area

The mobile data memory MDS D124, device group II, category 1G or 1D may be installed and operated in zones 0, 1 and 2 or in the zones 20, 21 and 22.

The requirements of the directive 94/9/EC are met by the use of the following standards:

EN 60079-0:2009, EN 60079-11:2007, EN 61241-11:2006 and EN 60079-26:2007

When used in hazardous areas, the MDS D124 must not be operated with field strengths > 5 A / m to avoid impermissible heating. This is not the case with readers from the SIMATIC RF range (MOBY D, RF200 and RF300).

Identification

II 1 G Ex ia IIC T3 to T6 Ga

or

II 1 D Ex ia IIIC T80 °C to T180 °C Da

TÜV 12 ATEX 084413 X

The temperature class or the maximum surface temperature depends on the maximum ambient temperature. The relationship between temperature class (gas) or maximum surface temperature (dust) can be found in the following table.

Table 7- 8 Ambient temperature

Ambient temperature range	Temperature class	Max. surface temperature
-25 ... +150 °C	T3	T180
-25 ... +100 °C	T4	T130
-25 ... +65 °C	T5	T95
-25 ... +50 °C	T6	T80

Note

Safety markings for hazardous areas

Since there is not enough space on the MDS D124 for the safety mark, this is supplied as a label with the device.

This must be affixed immediately next to the MDS D124 so that the label clearly relates to the device.

⚠ WARNING

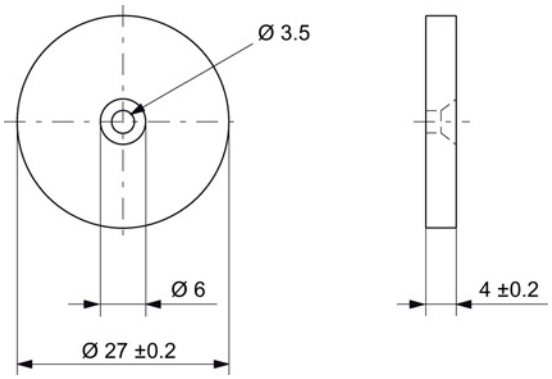
Danger due to electrostatic discharge

NOTICE

Installation and operating conditions for hazardous areas:

- The device may not be used in areas influenced by processes that generate high electrostatic charges.
- The device must be installed so that it is mechanically protected.
- For applications requiring devices of category 1, the device must be mounted on a grounded, conductive base.
- It must only be cleaned with a damp cloth.
- The device is suitable for use in atmospheres containing dust, however not for full immersion in dust.

7.3.6 Dimension drawing



Dimensions in mm

Figure 7-7 Dimension drawing of MDS D124

7.4 MDS D126

7.4.1 Characteristics

MDS D126	Characteristics	
	Fields of application	Compact and rugged ISO transponder; suitable for identification of transport units in production-related logistics; can also be deployed in harsh conditions
	Memory	EEPROM 128 bytes / gross 112 bytes net
	Read/write range	See Section Field data (Page 35)
	Standard	ISO-15693

7.4.2 Ordering data

Table 7- 9 Ordering data for MDS D126

	Order number
MDS D126	6GT2600-0AE00

7.4.3 Technical specifications

Table 7- 10 Technical data for MDS D126

Memory size	128 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 8 bytes
• Application memory	• 112 bytes
Storage technology	EEPROM
Memory organization	EEPROM 128 bytes gross 112 bytes net When using the OTP area, 16 bytes of it must be subtracted in 4-byte blocks
Protocol	ISO 15693
Data retention (at +40 °C)	10 years
Data transmission rate	
• read	• approx. 2 ms/byte
• write	• approx. 10 ms/byte
Bulk detection/multitag capability	Yes
Read cycles	Unlimited
Write cycles at +40 °C, typical	min. 100,000 typ. 1,000,000
Read/write distance (S_g)	See Section Field data (Page 35)
Distance from metal	≥ 25 mm (approx. 25 % reduction of the field data)
Power supply	Inductive power transmission (without battery)
Degree of protection to EN 60529	IP68 [1)]
Shock, tested in accordance with IEC 68-2-27	50 g [2)]
Vibration, tested in accordance with IEC 68-2-6	20 g [2)]
Torsion and bending load	Not permissible
Enclosure	
• Color	• Black
• Material	• Plastic PA 6.6 GF
• Dimensions (D x H) in mm	• 50 (±0.3) x 3.6 (±0.2)
• Mounting hole (d in mm)	• 5,1 (±0,2)
MDS fixing	M4 screws, tightening torque (at room temperature) ≤ 1 Nm, adhesive

Ambient temperature	
• During operation	• -25 °C to +85 °C
• Transport and storage	• -40 °C to +100 °C
Weight, approx.	13 g

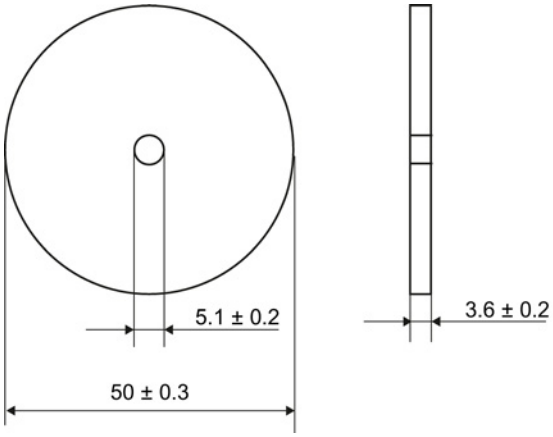
1) 2 hours, 2 m, +20 °C

2) The values for shock and vibration are maximum values and must not be applied continuously.

Note

It is recommended that a test is performed in critical applications.

7.4.4 Dimension drawing



Dimensions in mm

Figure 7-8 Dimension drawing of MDS D126

7.5 MDS D127

7.5.1 Features

MDS D127	Features	
	Area of application	Very compact data carrier that can be screwed into areas where precise positioning is necessary; e.g. tool identification, workpiece holders etc.
	Memory	128 bytes EEPROM/gross 112 bytes user memory
	Reading / writing range	See section "Field data (Page 35)"
	Mounting in metal	Flush mounted
	ISO standard	ISO 15693

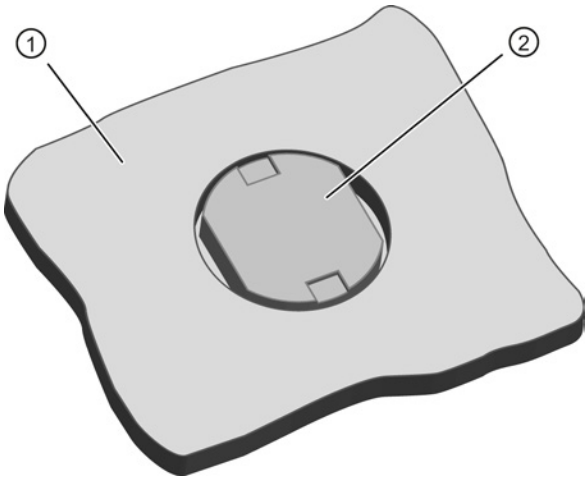
7.5.2 Ordering data

Table 7- 11 Ordering data for MDS D127

Product	Order number
MDS D127 Pack of 10 (A screw-in aid is supplied with each pack)	6GT2600-0AF00

7.5.3 Mounting in metal

Flush-mounted in metal



① Metal
② Transponders

Note

Damage to the transponder due to improper mounting

To screw the MDS D127 into a suitable thread, use the supplied screw-in tool. This avoids damage to the MDS D127.

Figure 7-9 Screw-in aid for mounting the MDS D127

7.5.4 Technical specifications

Table 7- 12 Technical specifications for MDS D127

Memory size		128 bytes
Memory configuration • Serial number • Configuration memory • Application memory		 • 8 bytes (fixed code) • 8 bytes • 112 bytes
Storage technology		EEPROM
Memory organization		Refer to the RF200 or RF300 system manual, section "Memory configuration of the ISO tags"
Data retention (at +40 °C)		10 years
MTBF (at +40 °C)		≥ 2 x 10^6 hours
Read cycles		unlimited
Write cycles (at +40 °C) • minimum • Typical		 • 100 000 • 1 000 000
Read/write distance (S_g)		See section "Field data (Page 35)"
Multitag capability		Yes
Power supply		inductive power transmission (without battery)
Degree of protection according to EN 60529 Degree of protection according to DIN 40050 Part 9		IP68 [1] IPx9K [2]
Shock according to EN 60721-3-7, Class 7M3 Total shock response spectrum, Type II		100 g [3]
Vibration-resistant to EN 60721-3-7, Class 7M3		20 g 3)
Torsion and bending load		not permitted
Housing • Dimensions (D x H) • Color • Material		 • M6 x 5 mm (±0.2 mm) • Black • Plastic PA6
Securing		Screw-in, cemented
Ambient temperature	During operation	-25 ... +100 ℃
	During transportation and storage	-40 ... +125 ℃
Weight		Approx. 1 g

1) 2 hours, 2 m, +20 °C

2) steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C

3) The values for shock and vibration are maximum values and must not be applied continuously.

7.5.5 Dimension drawing

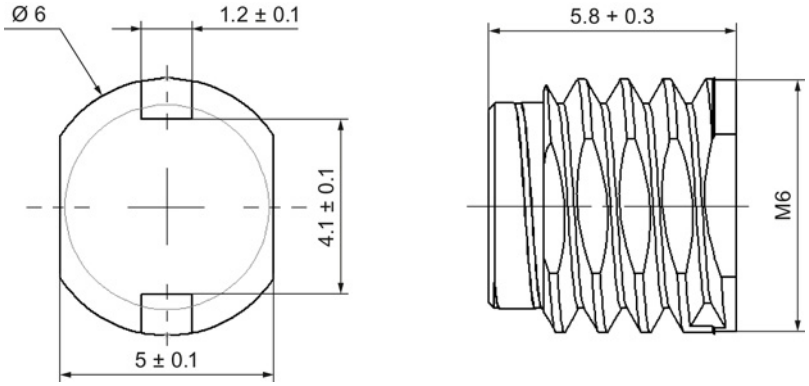


Figure 7-10 Dimensions in mm

7.6 MDS D139

7.6.1 Characteristics

MDS D139	Characteristics	
	Field of application	Applications in production logistics and in assembly lines subject to high temperatures (up to +220 °C) Typical application areas: • Paintshops and their preparatory treatments) • Primer coat, electrolytic dip area, cataphoresis with the associated drying furnaces • Top coat area with drying furnaces • Washing areas at temperatures > 85 °C • Other applications with higher temperatures
	Memory	EEPROM 128 bytes gross 112-byte user memory
	Read/write range	See Chapter Field data (Page 35).
	Mounting on metal	With spacer; recommended distance from metal ≥ 30 mm
	ISO standard	ISO 15693
	High degree of protection	IP68, IPx9K
	Material	Plastic PPS; silicone-free

7.6.2 Ordering data

Table 7- 13 Ordering data for MDS D139

	Order number
MDS D139	6GT2600-0AA10

Table 7- 14 Ordering data for MDS D139 accessory

MDS D139 accessory	Order number
Spacer	6GT2690-0AA00
Quick change holder	6GT2690-0AH00

7.6.3 Metal-free area

Direct mounting of the MDS D139 on metal is not allowed. A distance of ≥ 30 mm is recommended. This can be achieved using spacers, see Auto-Hotspot.

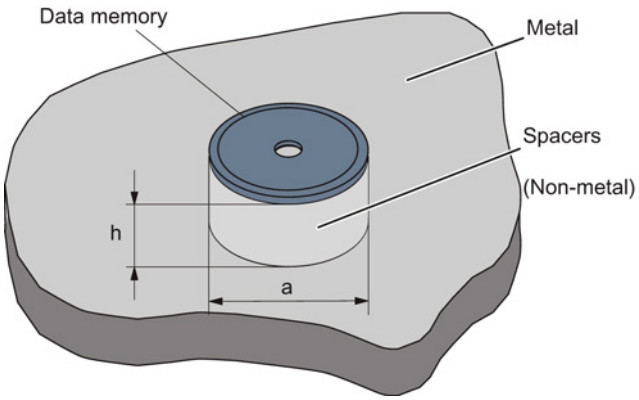


Figure 7-11 Metal-free area for MDS D139

Note

If the minimum guide values (h) are not observed, a reduction of the field data results. It is possible to mount the MDS with metal screws (M5). This has no tangible impact on the range. It is recommended that a test is performed in critical applications.

7.6.4 Technical specifications

Table 7- 15 Technical data for MDS D139

Memory size	128 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 8 bytes
• Application memory	• 112 bytes
Storage technology	EEPROM
Memory organization	See MOBY D System Manual, Chapter 5.1, "Mobile Data Storage Units, Introduction", section "Memory Allocation"
Data retention	10 years
MTBF	2 x 10^6 hours
Read cycles	Unlimited

Write cycles at +40 °C			
• minimum		• 100 000	
• typical		• 1.000.000	
Read/write distance (S_g)		See Chapter Field data (Page 35).	
Distance from metal		min. 30 mm (approx. 30% reduction of the field data)	
Multitag capability		Yes	
Power supply		Inductive power transmission (without battery)	
Degree of protection to EN 60529		IP68 [1] IPx9K [2]	
Shock according to EN 60721-3-7, Class 7M3 Total shock response spectrum, Type II		50 g	
Vibration-resistant to EN 60721-3-7, Class 7M3		20 g	
Torsion and bending load		Not permissible	
Enclosure dimensions			
• Dimensions (D x H) in mm		• 85 (±0.5) x 15 (-1.0)	
• Color		• Black	
• Material		• Plastic PPS, silicone-free	
Fixing		3 x M5 screw [1]	
Tightening torque		1,5 Nm [4]	
Ambient temperature	• During operation	-25 °C to +100 °C	Permanent
		+120 °C to +140 °C	20% reduction in the limit distance
		+200 °C [5]	Tested up to 5000 hours or 3000 cycles
		+220 °C	Tested up to 2000 hours or 1500 cycles
	• Transport and storage	-40 °C to +100 °C	
Weight		Approx. 50 g	

1) 2 hours, 2 m, +20 °C

2) steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C

3) For mounting with the spacer (6GT2690-0AA00), use a stainless steel M5 screw to avoid damaging the MDS in high temperatures (expansion coefficient).

4) In higher temperatures (> +80 °C), observe the expansion coefficient of all materials in order to prevent damage to the MDS due to fastening.

5) Note that no processing is possible at temperatures of +140 °C or higher.

7.6.5 Use of the MDS D139 in hazardous areas

The MDS D139 mobile data memory is classed as a piece of simple, electrical equipment and can be operated in Protection Zone 2, Device Group II, Category 3G.

The following requirements of the Directive 94/9/EC are fulfilled:

EN 60079-0 :2006

EN 60079-15 : 2005

EN 61241-0 : 2006

EN 61241-1 : 2004

Identification

II 3 G Ex nA II T2

II 3 D Ex tD A22 IP68 T 220°C

KEMA 09 ATEX 0133 X

Ta: -25 ... +220°C

WARNING
Gefahr durch elektrostatische Entladungen Potential electrostatic charging hazard Danger potentiel de charges électrostatiques

Note

Installations- und Betriebsbedingungen für den Ex-Schutzbereich:

a) Der Einsatz des Gerätes in der Nähe von stark ladungserzeugenden Prozessen ist untersagt.

b) Das Gerät ist mechanisch geschützt zu montieren.

c) Die Montage muss auf einem geerdeten, leitenden Untergrund erfolgen.

d) Die Reinigung darf nur mit feuchtem Tuch erfolgen.

Installation and operating conditions for hazardous areas:

a) Use of the equipment in the vicinity of processes generating high charges is not allowed.

b) The equipment must be mechanically protected when installed.

c) Installation must be performed on a grounded and conductive mounting surface.

d) Cleaning only with a wet cloth

Conditions d'installation et de mise en oeuvre pour la zone de protection Ex :

a) L'utilisation de l'appareil près de processus générant de fortes charges est interdite.

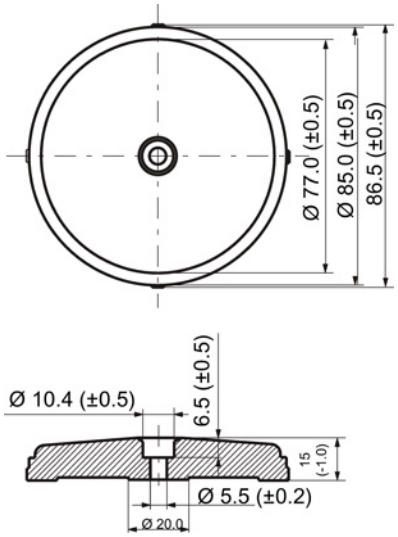
b) L'appareil doit être monté de manière à être protégé mécaniquement.

c) Le montage doit être effectué sur un socle conducteur mis à la terre.

d) Nettoyage uniquement avec un chiffon humide

7.6.6 Dimension drawings

Dimensional drawing of MDS D139



Dimensions in mm

Figure 7-12 Dimensional drawing of MDS D139

Dimensional drawing of spacer 6GT2690-0AA00

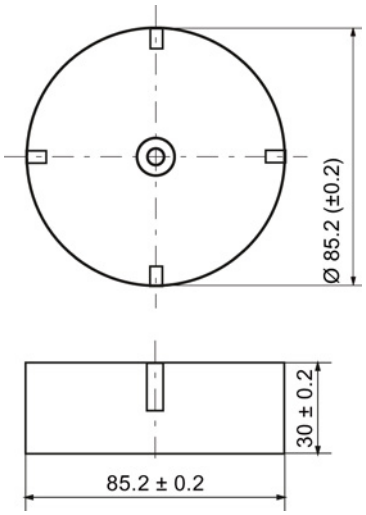


Figure 7-13 Dimensional drawing of spacer 6GT2690-0AA00

Dimensional drawing of spacer 6GT2690-0AH00

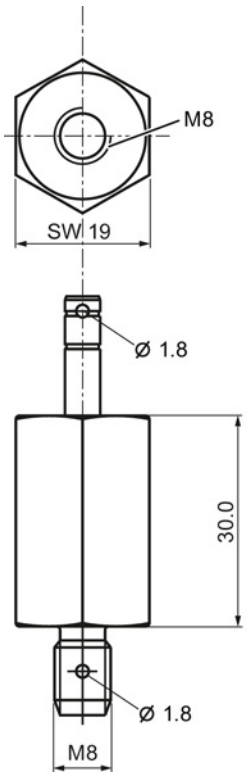


Figure 7-14 Dimensional drawing of spacer 6GT2690-0AH00

7.7 MDS D160

7.7.1 Characteristics

MDS D160	Characteristics	
	Field of application	Typical applications are, for example: • Rented work clothing • Hotel laundry • Surgical textiles • Hospital clothing • Dirt collection mats • Clothing for nursing homes/hostels
	Memory	EEPROM 128 bytes gross 112 bytes net capacity
	Read/write range	See Chapter Field data (Page 35).
	Mounting on metal	With spacer: Recommended distance from metal ≥ 10 mm
	High resistance	Thanks to its rugged packaging, the MDS D160 is a transponder that can be used under extreme environmental conditions. It is washable, heat-resistant and resistant to all chemicals generally used in the laundry process.
	ISO standard	ISO 15693

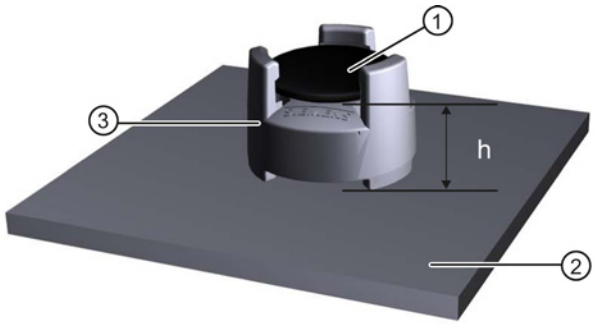
7.7.2 Ordering data

Table 7- 16 Ordering data for MDS D160

	Order number
MDS D160	6GT2600-0AB10
Spacer for MDS D160 / MDS D460	6GT2690-0AG00

7.7.3 Mounting on metal

Mounting on metal



h ≥ 25 mm

Figure 7-15 Mounting of the MDS D160 on metal with spacer

Note

If the minimum guide values (h) are not observed, a reduction of the field data results.
In critical applications, it is recommended that a test is performed.

Flush-mounting

Flush-mounting of the MDS D160 in metal is not permitted!

7.7.4 Technical specifications

Memory size	128 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 8 bytes
• Application memory	• 112 bytes
Storage technology	EEPROM
Memory organization	EEPROM 128 bytes gross 112 bytes net capacity Only for the RF300: When using the OPT area, 16 bytes of it must be subtracted in 4 byte blocks
Protocol	According to ISO 15693
Data retention (at +55 °C)	10 years

MTBF (at +40 °C)		2 x 10 ^{6} hours	
Bulk detection/multitag capability		Yes	
Data retention		10 years	
Read cycles		Unlimited	
Write cycles at + 40 °C, typical		1 000 000	
Write cycles, min.		100 000	
Read/write distance (S_g)		See Chapter Field data (Page 35)	
Distance from metal		Min. 25 mm (approx. 30% reduction of the field data)	
Power supply		Inductive power transmission (without battery)	
Degree of protection to EN 60529		IP68 (24 hours, 2 m, +20 °C)	
Shock, tested in accordance with IEC 68-2-27		40 g (18 ms; 6 axes; 2000 repeats/h)	
Vibration, tested in accordance with IEC 68-2-6		10 g (10 to 2000 Hz; 3 axes; 2.5 h)	
Torsion and bending load		Not permissible	
Mechanical strength			
• Isostatic pressure		• 300 bar for 5 min	
• Axial pressure		• 1000 N for 10 s	
• Radial pressure		• 1000 N for 10 s	
Resistance to chemicals		All chemicals normally used in the washing process	
MDS lifespan		At least 100 wash cycles	
Mechanical design			
• Color		• White	
• Material		• PPS, pressed, impact-resistant plastic	
• Dimensions (D x H) in mm		• 16 (±0.2) x 3.0 (±0.2)	
MDS fixing		Patch, sew, glue	
Ambient temperature	During operation	-25 °C to +85 °C	Permanent
		+125 °C	for 1000 hours (20% reduction in the limit distance)
		+175 °C [1]	500 x for 10 minutes
		+220 °C [1]	1 x for 30 seconds
	Transport and storage	-25 °C to +100 °C	
Weight, approx.		1 g	

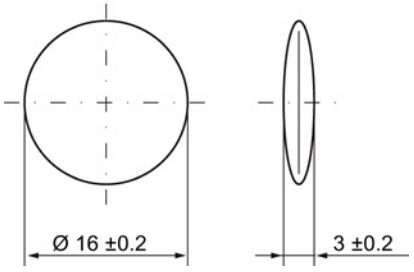
[1] No processing possible from +140 °C upwards

Note

- Regeneration time for the MDS D160 between wash cycles must be at least 24 hours
- It is recommended that a test is performed in critical applications.

7.7.5 Dimension drawings

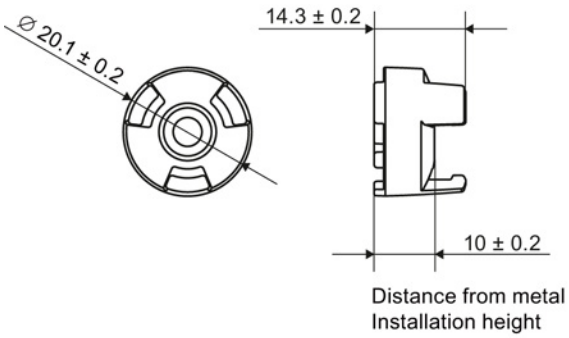
Dimensional drawing of MDS D160



Dimensions in mm

Figure 7-16 Dimensional drawing of MDS D160

Dimensional drawing of spacer



Dimensions in mm

Figure 7-17 Dimensional drawing of spacer

7.8 MDS D165

7.8.1 Features

MDS D165 (special version)	Features	
	Application area	The design of the transponder (self-adhesive label) permits a variety of designs, guaranteeing optimum dimensioning for the widest variety of applications. From simple identification such as electronic barcode replacement/supplementation, through warehouse and distribution logistics, right up to product identification.
	Memory	112-byte user memory
	Read/write range	See Chapter Field data (Page 35).
	ISO standard	15693 with I-Code SLI technology.

7.8.2 Ordering data

Table 7- 17 Ordering data for MDS D165

	Order No.
MDS D165 (special version ISO-CARD)	6GT2600-1AB00-0AX0

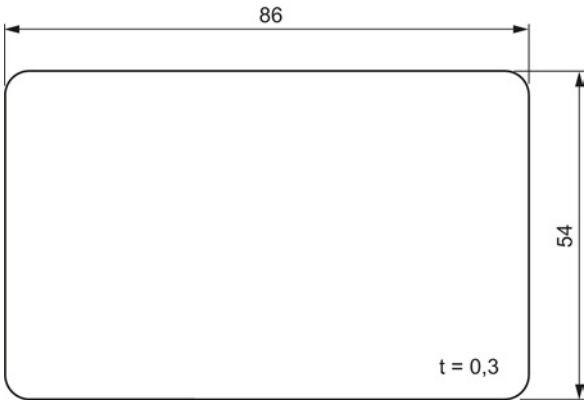
Type of delivery

Minimum order quantity: 1250 units (5 rolls with 250 units each)

7.8.3 Technical data

Memory configuration	
• Serial number (UID)	• 8 bytes (fixed code)
• Configuration memory	• 6 bytes
• AFI/DSFID	• 2 bytes
• Application memory	• 112 bytes
Storage technology	EEPROM
Memory organization	4 bytes, block by block
Protocol	according to ISO 15693
Data transmission rate	
• reading	• approx. 3.5 ms/byte
• writing	• approx. 9.5 ms/byte
Multitag capability	Yes
Data retention	10 years
Read cycles	Unlimited
Write cycles, min.	100 000
Recommended distance to metal	25 mm (approx. 30% reduction of the field data)
Power supply	Inductive power transmission (without battery)
Typical read/write distance (Sg)	See Chapter Field data (Page 35)
Degree of protection according to EN 60529	IP65
Dimensions	
• L x W (in mm)	• 86 x 54
• Height	• approx. 0.3 mm
Material	
• Top	• PET plastic (label material)
• Inlay	• PET plastic (carrier material)
• Antenna	• Aluminum
• Bottom	• Double-sided transfer adhesive on silicon paper
Color	White
Mounting	Single-sided adhesive (self-adhesive label)
Imprinting	Yes, (heat transfer method)
• Ambient temperature during operation	• -25 °C to +85 °C
• Storage temperature	• +20 °C to +30 °C (the storage period is 2 years, determined by durability of the adhesive)

7.8.4 Dimension drawing

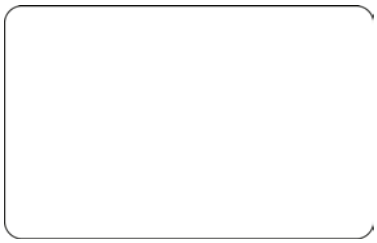


Dimensions in mm

Figure 7-18 Dimension drawing of MDS D165

7.9 MDS D200

7.9.1 Features

MDS D200 (special version)	Features	
	Application area	From simple identification such as electronic barcode replacement/supplementation, through warehouse and distribution logistics, right up to product identification.
	Memory	256-byte user memory
	Read/write range	See Chapter Field data (Page 35).
	Mounting on metal	Recommended distance from metal ≥ 30 mm
	ISO standard	15693 with Tag-it HFI technology

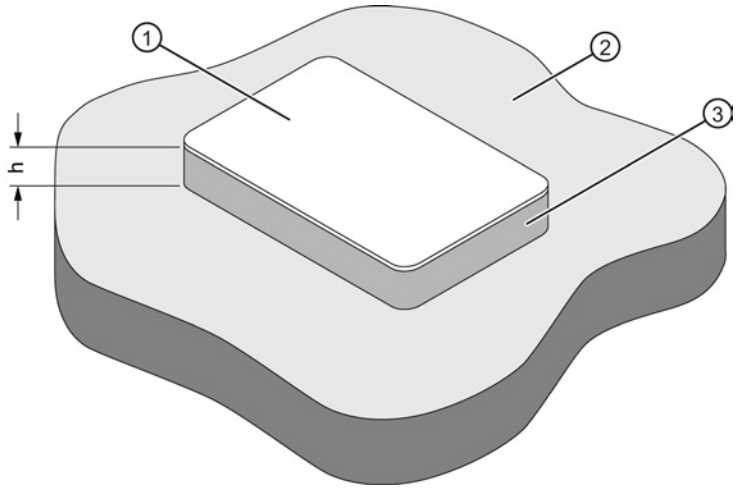
7.9.2 Ordering data

Table 7- 18 Ordering data for MDS D200

	Order No.
MDS D200 (special version ISO-CARD)	6GT2600-1AD00-0AX0

7.9.3 Mounting on metal

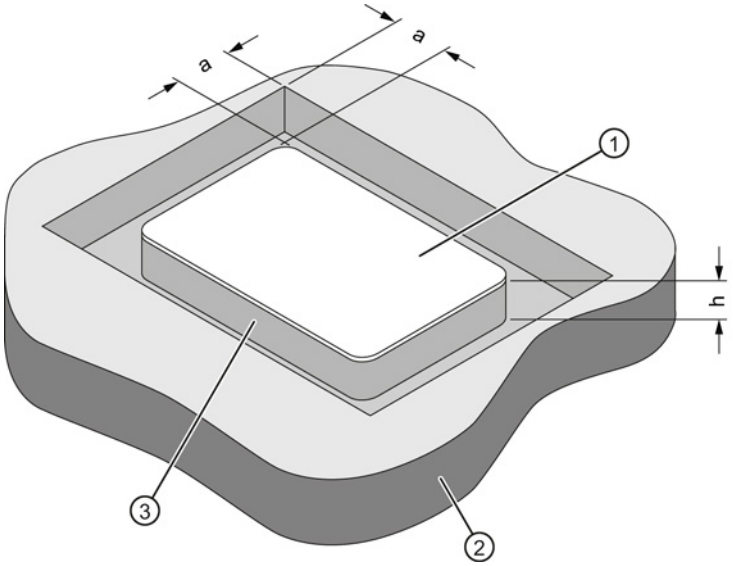
Mounting on metal



h ≥ 20 mm
① Data memory
② Metal
③ Non-metal

Figure 7-19 Mounting of the MDS D200 on metal with spacer

Flush-mounting



a ≥ 20 mm
h ≥ 20 mm
① Data memory
② Metal
③ Non-metal

Figure 7-20 Flush-mounting of MDS D200 in metal with spacer

Note

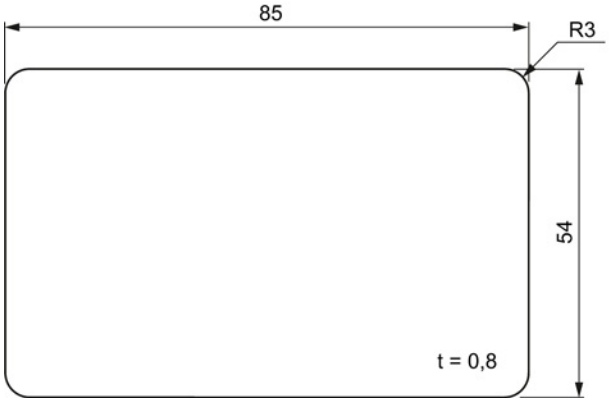
If the minimum guide values (h) are not observed, a reduction of the field data results.

7.9.4 Technical data

Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Application memory	• 256 bytes
Storage technology	EEPROM
Memory organization	4 bytes, block by block
Protocol	according to ISO 15693
Data retention (at +25 °C)	10 years
MTBF (at +25 °C)	2 x 105 hours

• Read cycles	• Unlimited
• Write cycles, min.	• 100 000
• Write cycles, typical	• 1 000 000
Read/write distance (Sg)	See Chapter Field data (Page 35)
Recommended distance to metal	25 mm (approx. 30% reduction of the field data)
Multitag capability	Yes
Power supply	Inductive power transmission (without battery)
Degree of protection according to EN 60529	IP67
Vibration	ISO 10373/ISO 7810
Torsion and bending load	ISO 10373/ISO 7816-1
Mechanical design	Laminated plastic card, printable on both sides
• Color	• White
• Material	• PET
• Dimensions (L x W x H in mm)	• 85 x 54 x 0.8
Mounting	Adhesive, fixing lug
Ambient temperature	
• Operation	• -20 °C to +60 °C
• Transport and storage	• -20 °C to +60 °C
Weight	approx. 5 g

7.9.5 Dimension drawing



Dimensions in mm

Figure 7-21 Dimension drawing of MDS D200

7.10 MDS D261

7.10.1 Features

MDS D261 (special version)	Features	
	Application area	The design of the transponder (self-adhesive label) permits a variety of designs, guaranteeing optimum dimensioning for the widest variety of applications. From simple identification such as electronic barcode replacement/supplementation, through warehouse and distribution logistics, right up to product identification.
	Memory	256-byte user memory
	Read/write range	See Chapter Field data (Page 35).
	ISO standard	15693 with Tag-it HFI technology.

7.10.2 Ordering data

Table 7- 19 Ordering data for MDS D261

	Order No.
MDS D261	6GT2600-1AA00-0AX0

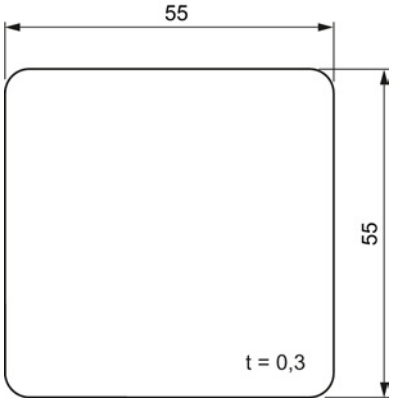
Type of delivery

Minimum order quantity: 1250 units (5 rolls with 250 units each)

7.10.3 Technical data

Memory configuration	
• Serial number	• 8 bytes (fixed code)
• AFI/DSFID	• 2 bytes
• Application memory	• 256 bytes
Storage technology	EEPROM
Memory organization	4 bytes, block by block
Protocol	according to ISO 15693
Data transmission rate	
• reading	• approx. 3.5 ms/byte
• writing	• approx. 9.5 ms/byte
Multitag capability	Yes
Data retention	10 years
Read cycles	Unlimited
Write cycles, min.	100 000
Recommended distance to metal	25 mm (approx. 30% reduction of the field data)
Power supply	Inductive power transmission (without battery)
Typical read/write distance	See Chapter Field data (Page 35)
Degree of protection according to EN 60529	IP65
Dimensions	
• L x W (in mm)	• 55 x 55
• Height	• approx. 0.3 mm
Material	
• Top	• PET plastic (label material)
• Inlay	• PET plastic (carrier material)
• Antenna	• Aluminum
• Bottom	• Double-sided transfer adhesive on silicon paper
Color	White
Mounting	Single-sided adhesive (self-adhesive label)
Imprinting	Yes (heat transfer method)
• Ambient temperature during operation	• -25 °C to +85 °C
• Storage temperature	• +20 °C to +30 °C (the storage period is 2 years, determined by durability of the adhesive)
Type of delivery	Minimum order quantity 1250 units (5 rolls with 250 units each)

7.10.4 Dimension drawing



Dimensions in mm

Figure 7-22 Dimension drawing of MDS D261

7.11 MDS D324

7.11.1 Characteristics

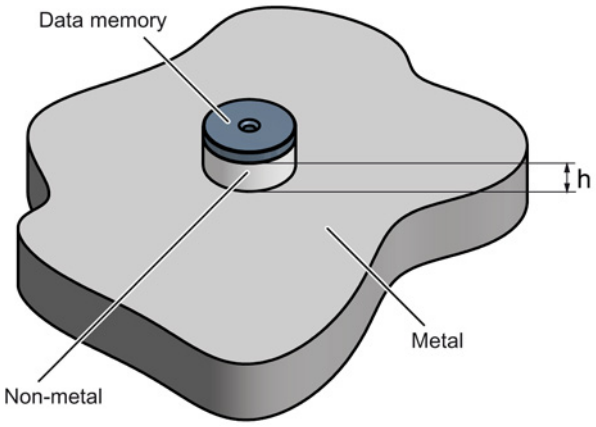
MDS D324	Characteristics	
	Field of application	Production and distribution logistics and product identification
	Memory	EEPROM 1024 bytes gross 992 bytes net capacity
	Read/write range	See Chapter Field data (Page 35).
	Mounting on metal	Not possible: Recommended distance from metal ≥ 25 mm
	High resistance	Can also be used in harsh environments under extreme environmental conditions (e.g. with higher temperature load).
	ISO standard	ISO 15693

7.11.2 Ordering data

Table 7- 20 Ordering data MDS D324

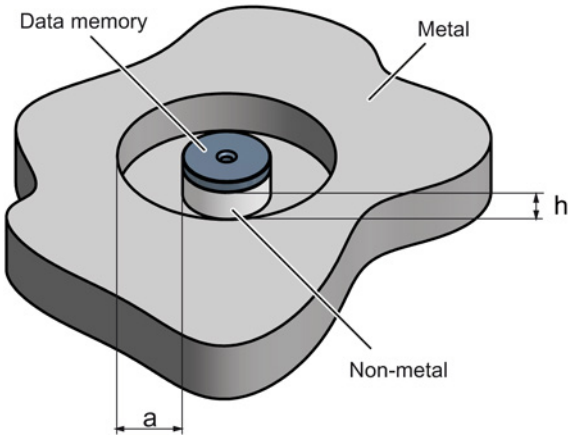
	Order number
MDS D324	6GT2600-3AC00

7.11.3 Metal-free area



h ≥ 25 mm

Figure 7-23 Mounting of the MDS D324 on metal with spacer



h ≥ 25 mm

a ≥ 25 mm

Figure 7-24 Flush-mounting of MDS D324 in metal with spacer

Note

If the minimum guide values (h) are not observed, a reduction of the field data results. It is possible to mount the MDS with metal screws (M3 countersunk head screws). This has no tangible impact on the range.

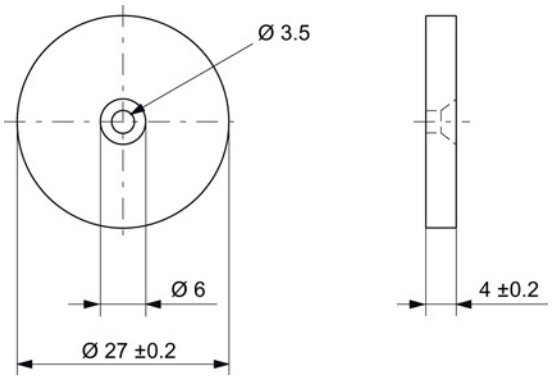
7.11.4 Technical specifications

Table 7- 21 Technical data MDS D324

Memory size	1024 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 1008 bytes
• Manufacturer data	• 8 bytes
Storage technology	EEPROM
Memory organization	1024 EEPROM/gross 992 net capacity When using the OPT area, 16 bytes of it must be subtracted in 4 byte blocks
Protocol	according to ISO 15693
Data retention (at +40 °C)	10 years
MTBF (at +40 °C)	≥ 1.5 x 10^6 hours
Read cycles	Unlimited
Write cycles, typical	1 000 000
Write cycles, min.	100 000
Read/write distance (S_g)	See Chapter Field data (Page 35)
Distance from metal	Min. 25 mm (approx. 30% reduction of the field data)
Multitag capability	Yes
Anti-collision speed	Approx. 20 transponders/s simultaneously identifiable
Power supply	Inductive power transmission (without battery)
Degree of protection to EN 60529	IP67
Shock resistant to EN 60721-3-7, Class 7M3 total shock response spectrum, type II	100 g
Vibration-resistant to EN 60721-3-7, Class 7M3	20 g
Torsion and bending load	Not permissible
Enclosure	
• Dimensions (D x H) in mm	• 27(±-0,2) x 4(±0.2)
• Color	• Black
• Material	• Epoxy casting resin
Fixing	Adhesive, M3 screw
Tightening torque at +20 °C	≤ 1 Nm (at high temperatures, the expansion coefficients of the materials used must be taken into account)

Ambient temperature	
• Operation	• -25 °C to +125 °C
• During transportation and storage	• -40 °C to +150 °C
Weight, ca.	5 g

7.11.5 Dimension drawing



Dimensions in mm

Figure 7-25 Dimension drawing of MDS D324

7.12 MDS D339

7.12.1 Characteristics

MDS D339	Characteristics	
	Field of application	Applications in production automation with high temperature demands (up to +220 °C) Typical application areas: • Paintshops and their preparatory treatments • Primer coat, electrolytic dip area, cataphoresis with the associated drying furnaces • Top coat area with drying furnaces • Washing areas at temperatures > 85 °C • Other applications with higher temperatures
	Memory	1024 bytes of EEPROM/gross 992 bytes of user memory
	Read/write range	See Chapter Field data (Page 35).
	Mounting on metal	With spacer; recommended distance from metal ≥ 30 mm
	ISO standard	ISO 15693
	High degree of protection	IP68, IPx9K
	Material	Plastic PPS; silicone-free

7.12.2 Ordering data

Table 7- 22 Ordering data for MDS D339

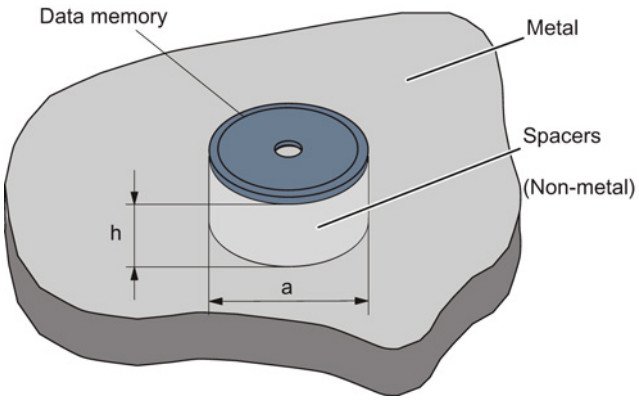
Transponder	Order number
MDS D339	6GT2600-3AA10

Table 7- 23 Ordering data for MDS D339 accessories

Accessories	Order number
Spacers	6GT2690-0AA00
Quick change holder	6GT2690-0AH00

7.12.3 Mounting on metal

Direct mounting of the MDS D339 on metal is not allowed. A distance of ≥ 30 mm is recommended. This can be achieved using spacers, see Auto-Hotspot.



a = ∅ 85 mm

h ≥ 30 mm

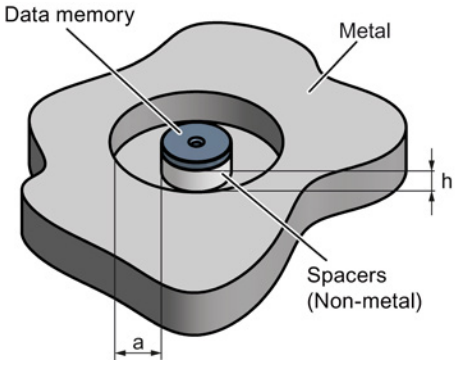
Figure 7-26 MDS D339: Mounting on metal

Note

If the minimum guide values (h) are not observed, a reduction of the field data results. It is possible to mount the MDS with metal screws (M5). This has no tangible impact on the range. It is recommended that a test is performed in critical applications.

7.12.4 Mounting in metal

It is possible to mount the MDS D339 in metal. With large antennas, for example ANT D5, this leads to a reduction of ranges.



a = 100 mm

h = 30 mm

Figure 7-27 MDS D339: Mounting in metal

7.12.5 Technical specifications

Table 7- 24 Technical specifications of MDS D339

Memory size	1024 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 24 bytes
• Application memory	• 992 bytes
Storage technology	EEPROM
Memory organization	Refer to the MOBY D system manual or RF300 section "Memory configuration of the ISO tags"
Data retention (at +40 °C)	10 years
MTBF	2 x 10^6 hours
Read cycles	Unlimited
Write cycles (at +40 °C)	
• minimum	• 100,000
• typical	• 1,000,000
Read/write distance (S_g)	See table Field data (Page 35).
Distance from metal	min. 30 mm (approx. 30% reduction of the field data)
Multitag capability	Yes
Power supply	Inductive power transmission (without battery)

Degree of protection to EN 60529		IP68 [1] IPx9K [2]	
Shock according to EN 60721-3-7, Class 7M3 Total shock response spectrum, Type II		50 g	
Vibration-resistant to EN 60721-3-7, Class 7M3		20 g	
Torsion and bending load		Not permissible	
Enclosure dimensions • Dimensions (D x H) • Color • Material		• 85 mm (±0.5) x 15 mm (-1.0) • Black • Plastic PPS, silicone-free	
Fixing		1 x stainless steel screw, thread M5 [3]	
Tightening torque		1.5 Nm [4]	
Ambient temperature	• In operation	-25 °C to +100 °C	Permanent
		+120 °C to +140 °C	20% reduction in the limit distance
		+25 °C ... +200 °C [5]	Up to 6000 cycles tested
		+25 °C ... +220 °C [5]	Up to 2000 cycles tested
	• Transport and storage	-40 °C to +100 °C	
Weight		Approx. 50 g	

1) 2 hours, 2 m, +20 °C

2) steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C

3) See chapter Mounting options

4) Max. torque when securing the MDS. When used in higher temperatures (> +80 °C), remember the expansion coefficients of all materials (see chapter Mounting options).

5) Note that no processing is possible at temperatures of +140 °C or higher.

7.12.6 Use of the MDS D339 in hazardous areas

The MDS D339 mobile data memory is classed as a piece of simple, electrical equipment and can be operated in Protection Zone 2, Device Group II, Category 3G.

The following requirements of the Directive 94/9/EC are fulfilled:

EN 60079-0:2006, EN 60079-15:2005, EN 61241-0:2006, EN 61241-1:2004

Identification

II 3 G Ex nA II T6

Ii 3 D Ex tD A22 IP68 T 210°C

KEMA 09 ATEX 0133 X

WARNING

Gefahr durch elektrostatische Entladungen
Potential electrostatic charging hazard
Danger potentiel de charges électrostatiques

Note

Installations- und Betriebsbedingungen für den Ex-Schutzbereich:

a) Der Einsatz des Gerätes in der Nähe von stark ladungserzeugenden Prozessen ist untersagt.

b) Das Gerät ist mechanisch geschützt zu montieren.

c) Die Montage muss auf einem geerdeten, leitenden Untergrund erfolgen.

d) Die Reinigung darf nur mit feuchtem Tuch erfolgen.

Installation and operating conditions for hazardous areas:

a) Use of the equipment in the vicinity of processes generating high charges is not allowed.

b) The equipment must be mechanically protected when installed.

c) Installation must be performed on a grounded and conductive mounting surface.

d) Cleaning only with a wet cloth

Conditions d'installation et de mise en oeuvre pour la zone de protection Ex :

a) L'utilisation de l'appareil près de processus générant de fortes charges est interdite.

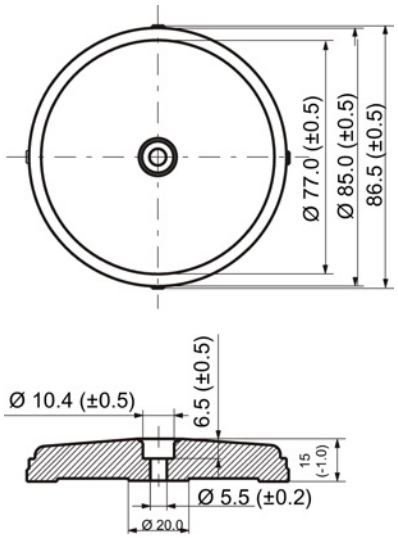
b) L'appareil doit être monté de manière à être protégé mécaniquement.

c) Le montage doit être effectué sur un socle conducteur mis à la terre.

d) Nettoyage uniquement avec un chiffon humide

7.12.7 Dimensional drawing

MDS D339



Dimensions in mm

Figure 7-28 Dimension drawing of the MDS D339

Spacers 6GT2690-0AA00

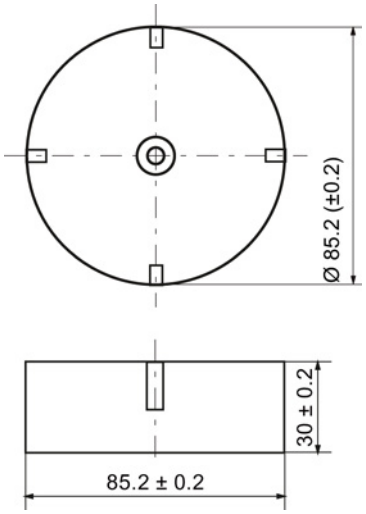


Figure 7-29 Dimension drawing of spacers 6GT2690-0AA00

Spacers 6GT2690-0AH00

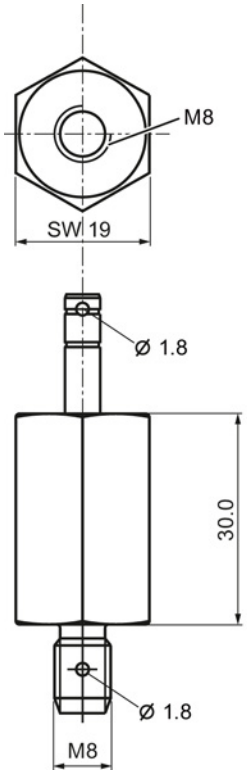


Figure 7-30 Dimension drawing of spacers 6GT2690-0AH00

7.13 MDS D400

7.13.1 Features

MDS D400	Features	
	Area of application	Simple identification such as electronic barcode replacement/supplements, from warehouse and distribution logistics right through to product identification.
	Memory	FRAM 2048 bytes gross 2000 bytes net
	Reading / writing range	See section "Field data (Page 35)"
	ISO standard	Based on ISO standard 15693
	Material	PVC

7.13.2 Ordering data

Table 7- 25 Ordering data of MDS D400

Product	Order number
MDS D400	6GT2600-4AD00

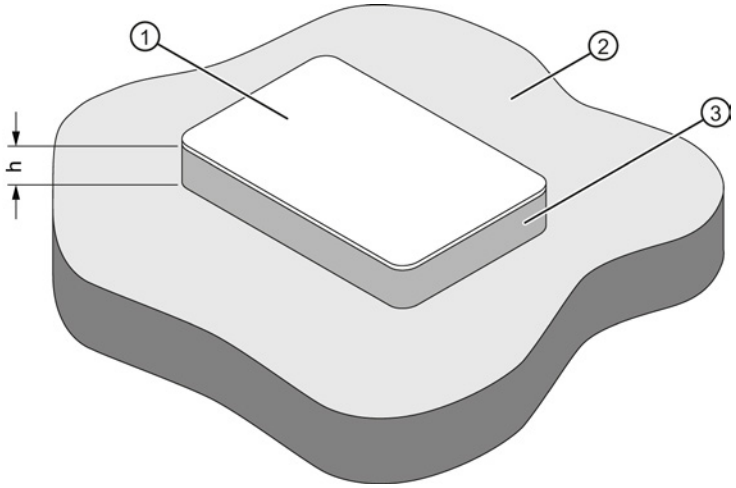
Table 7- 26 Accessories for MDS D400

Product	Order number
Spacer in conjunction with fixing pocket (6GT2190-0AB00)	6GT2190-0AA00
Fixing pocket for spacer	6GT2190-0AB00
Fixing pocket	6GT2390-0AA00

7.13.3 Mounting on metal

Mounting on metal

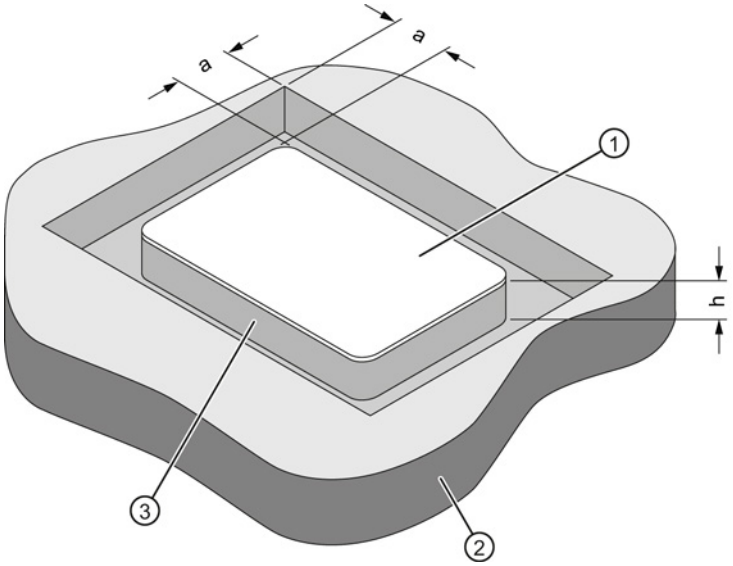
It is possible to mount the MDS D400 on metal.



h ≥ 20 mm
① Transponder
② Metal
③ Non-metal

Figure 7-31 Mounting of the MDS D400 on metal with spacer

Flush-mounted in metal



a ≥ 20 mm
h ≥ 20 mm
① Transponder
② Metal
③ Non-metal

Figure 7-32 Flush-mounting of MDS D400 in metal with spacer

Note

If the minimum guide values (h) are not observed, this will result in a reduction of the field data.

7.13.4 Technical specifications

Table 7- 27 Technical data MDS 400

Memory size	2048 bytes
Memory configuration • Serial number • Configuration memory • Application memory	 • 8 bytes (fixed code) • 40 bytes • 2000 bytes
Storage technology	FRAM
Memory organization	Refer to the MOBY D system manual, RF200 or RF300, section "Memory configuration of the ISO tags"

Data retention (at +40 °C)		10 years
MTBF (at +40 °C)		≥ 2 x 10^6 hours
Read cycles		> 10^{10}
Write cycles (at +40 °C)		> 10^{10}
Read/write distance (S_g)		See section "Field data (Page 35)"
Distance from metal		≥ 20 mm
Multitag capability		Yes
Power supply		inductive power transmission (without battery)
Degree of protection according to EN 60529		IP67
Vibration-resistant to EN 60721-3-7, Class 7M3		ISO 10373 / ISO 7810 [1]
Torsion and bending load		ISO 10373/ISO 7816-1
Housing • Dimensions (L x W x H) • Color • Material		Laminated plastic card, printable • 85.6 (±0.3) × 54 (±0.2) × 0.8 (±0.05) mm • White • PVC
Securing		Adhesive, fixing lug
Ambient temperature	During operation	-25 ... +60 ℃
	During transportation and storage	-25 ... +60 ℃
Weight		Approx. 5 g

[1] The values for vibration are maximum values and must not be applied continuously.

7.13.5 Dimension drawing

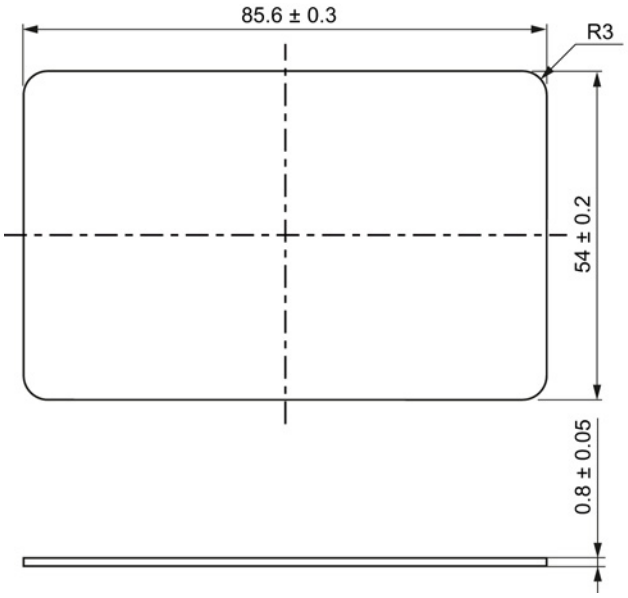


Figure 7-33 Dimensional drawing MDS D400 (dimensions in mm)

7.14 MDS D421

7.14.1 Characteristics

MDS D421	Characteristics	
	Field of application	The MDS D421 is designed for tool coding in accordance with DIN 69873. It can be used wherever small data carriers and exact positioning are required, e.g. tool identification, workpiece holders
	Memory	FRAM 2048 bytes gross 2000 bytes net
	Read/write range	See Chapter Field data (Page 35).
	Mounting	Flush-mounted in and on metal
	High resistance	Rugged packaging of the MDS D421; can therefore also be used in a harsh industrial environment without problem
	Standard	Oriented according to ISO standard 15693

7.14.2 Ordering data

Table 7- 28 Ordering data of MDS D421

	Order number
MDS D421	6GT2600-4AE00

7.14.3 Mounting on metal

Mounting on metal

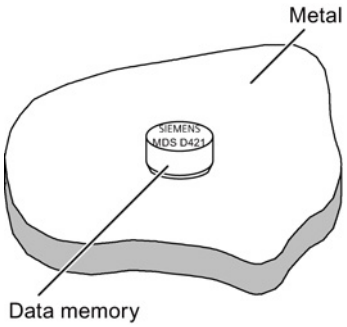


Figure 7-34 Mounting of MDS D421 on metal

Flush-mounting

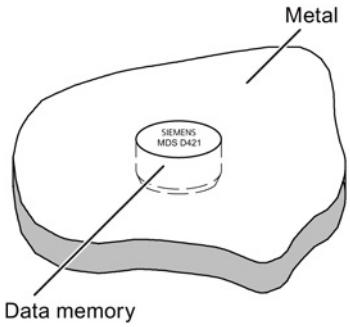


Figure 7-35 Mounting of MDS D421 in metal

Flush-mounting of MDS D421 in metal with tools

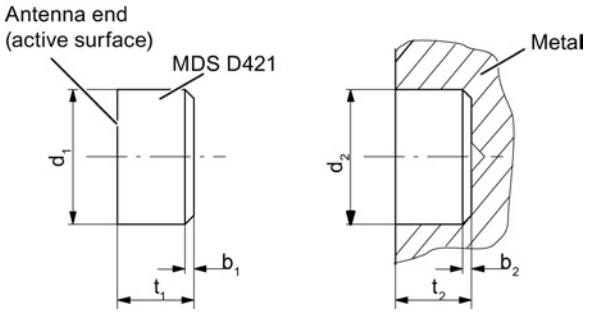


Figure 7-36 Flush-mounting of MDS D421 in metal with tools

b_1	0.5 x 45°	b_2	0.3 x 45° or R 0.3
d_1	10 (-0.04.. -0.13)	d_2	10 (+0.09... 0)
t_1	4.5 (-0... -0,1)	t_2	4.6 (+0.2... 0)

All dimensions in mm

Note

The MDS should not protrude out of the locating hole; it must be flush with the outside contour.

The mounting instructions of the MDS and the conditions associated with the application (e.g. peripheral speed, temperature, and use of coolant) must be observed during the installation.

Mounting information for adhesion

- Drill installation hole
- The adhesive surfaces must be dry, free from dust, oil, stripping agents and other impurities
- Apply adhesive according to the manufacturer's processing instructions
- Press in MDS D421 using your finger; antenna side to the outside (see figure "Flush-mounting of MDS D421 in metal with tools")
- Remove residues of adhesive
- Allow to cure according to the manufacturer's instructions
- Flush-mounting of MDS D421 in metal with tools

Installation examples

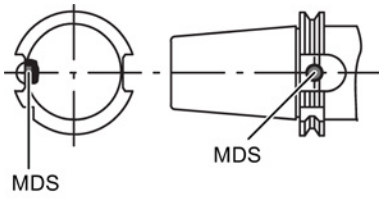


Figure 7-37 Installation example of MDS D421 in a steep cone

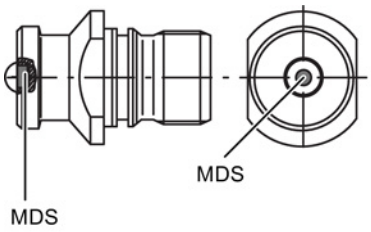


Figure 7-38 Installation example of MDS D421 in a stud bolt

7.14.4 Technical specifications

Table 7- 29 Technical data of MDS D421

Memory size	2048 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 40 bytes
• Application memory	• 2000 bytes
Storage technology	FRAM
Memory organization	2048 bytes gross 2000 bytes net
Protocol	ISO 15693
MTBF (at +40 °C)	2.5 x 10^6 hours
Read cycles	Unlimited
Write cycles at +40 °C	> 10^{10} typ.
Bulk detection/multitag capability	Yes
Data retention (at +40°C)	10 years
Read/write distance (S_g)	See Chapter Field data (Page 35)
Direction-dependent	No
Power supply	Inductive power transmission (without battery)
Vibration, tested in accordance with IEC 68-2-6	20 g [1)]
Shock, tested in accordance with IEC 68-2-27	100 g [1)]
Torsion and bending load	Not permissible

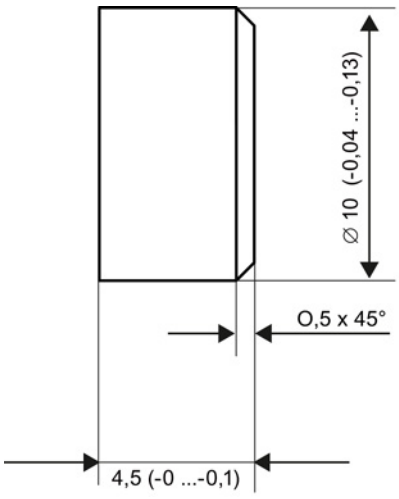
MDS fixing		Adhesion [2]; e.g. Araldit AW2101/HW2951 or 2021; UHU-Plus endfest 300
Degree of protection		
• In accordance with EN 60529		• IP67
• In accordance with DIN 40050 Part 9		• IPx9K [3]
Enclosure		Pressed, impact-resistant plastic
• Color		• Black
• Material		• Epoxy casting resin
• Dimensions (D x H) in mm (dimensions and tolerances in accordance with DIN 69873)		• 10 x 4.5 (chamfer underneath 0.5 x 45°)
Ambient temperature	During operation	–25 °C to +85 °C
	Transport and storage	–40 °C to +100 °C
Weight, approx.		4 g

[1] The values for shock and vibration are maximum values and must not be applied continuously.

[2] The manufacturer's processing instructions must be observed.

[3] steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C

7.14.5 Dimension drawing



Dimensions in mm

Figure 7-39 Dimension drawing of MDS D421

7.15 MDS D422

7.15.1 Characteristics

MDS D422	Characteristics	
	Field of application	Identification of metallic workpiece holders, workpieces or containers
	Memory	FRAM 2048 bytes gross 2000°bytes net
	Read/write range	See Chapter Field data (Page 35).
	ISO standard	Oriented according to ISO standard 15693

7.15.2 Ordering data

Table 7- 30 Ordering data of MDS D422

	Order number
MDS D422 A screw-in aid is included in the scope of supply per packaging unit	6GT2600-4AF00

7.15.3 Mounting on metal

Flush-mounting

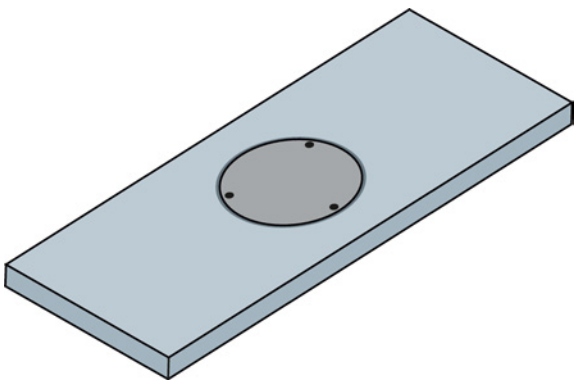


Figure 7-40 Mounting of MDS D422 in metal

Mounting information for screws

You can screw the transponder into a pre-drilled threaded hole using the screw-in aid.

Mounting information for adhesion

- Drill installation hole
- The adhesive surfaces must be dry, free from dust, oil, stripping agents and other impurities
- Apply adhesive according to the manufacturer's processing instructions
- Press in MDS D422 using your fingers; with antenna side to the outside (see Fig.)
- Remove residues of adhesive
- Allow to cure according to the manufacturer's instructions
- Flush-mounting of MDS D422 in metal with tools

7.15.4 Technical specifications

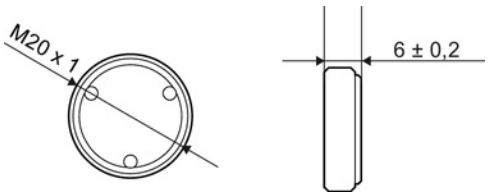
	6GT2600-4AF00
Product type designation	MDS D422
Memory size	2048 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 40 bytes
• Application memory	• 2000 bytes
Storage technology	FRAM
Memory organization	FRAM 2048 bytes / gross 2000 bytes net Only for the RF300: When using the OPT area, 16 bytes of it must be subtracted in 8 byte blocks
Protocol	ISO 15693
Data retention (at +40 °C)	10 years
MTBF (at +40 °C)	2 x 10^6 h
Data transmission rate Reading and writing	approx. 2 ms/byte
Bulk detection/multitag capability	Yes
Read cycles	unlimited
Write cycles (at +40 °C, typical)	>10^{10}
Read/write distance (S_g)	See section Field data (Page 35)

	6GT2600-4AF00
Power supply	Inductive power transmission (without battery)
Degree of protection to EN 60529	IP68 [1]
Shock, tested in accordance with IEC 68-2-27	50 g [2]
Vibration, tested in accordance with IEC 68-2-6	20 g [2]
Torsion and bending load	not permitted
Housing	
• Color	• Black, silver
• Material	• Plastic PA 6.6 GF; brass nickel plated
• Dimensions (D × pitch × H)	• M20 × 1 mm × 6 (± 0.2) mm
Transponder attachment	Screw in (M20 1 mm) Cement in
Ambient temperature	
• During operation	• -25 °C ... +85 °C
• During transportation and storage	• -40 °C ... +100 °C
Weight, approx.	13 g

[1] 2 hours, 2 m, +20 °C

[2] The values for shock and vibration are maximum values and must not be applied continuously.

7.15.5 Dimension drawing



Dimensions in mm

Figure 7-41 Dimensional drawing of MDS D422

7.16 MDS D423

7.16.1 Characteristics

MDS D423	Characteristics	
	Field of application	Identification of metallic workpiece holders, workpieces or containers, production automation
	Memory	FRAM 2048 bytes gross 2000 bytes net
	Installation	Can be mounted in and on metal

7.16.2 Ordering data

Table 7- 31 Ordering data of MDS D423

	Order number
MDS D423	6GT2600-4AA00

7.16.3 Mounting on metal

Mounting on metal

Direct mounting of the MDS D423 on metal is possible.

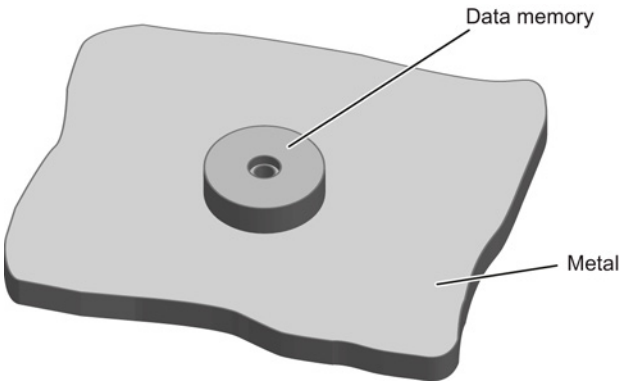
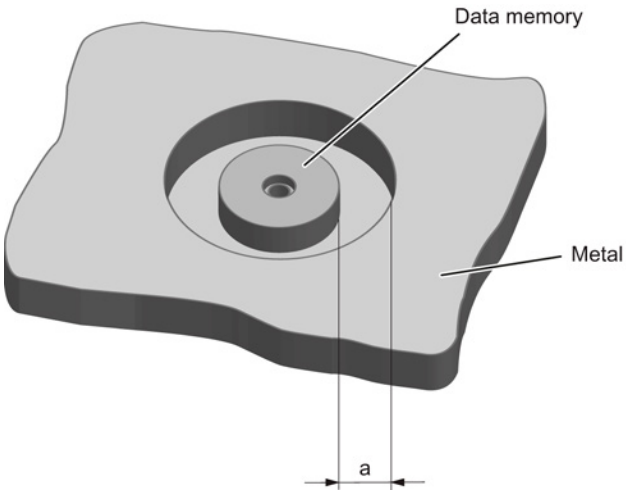


Figure 7-42 Mounting the MDS D423 on metal

Flush-mounted in metal

It is possible to mount the MDS D423 in metal.



a ≥ 10 mm

Figure 7-43 Flush-mounting of MDS D423 in metal

7.16.4 Technical specifications

Table 7- 32 Technical specifications of MDS D423

Memory size	2048 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 40 bytes
• Application memory	• 2000 bytes
Storage technology	FRAM
Memory organization	FRAM, 2048 bytes gross 2000 bytes net (when using the OPT area, 16 bytes of it must be subtracted in 8 byte blocks)
Report	ISO 15693
Data retention (at +40 °C)	10 years
MTBF (at +40 °C)	2 x 10^6 hours
Read cycles	Unlimited
Write cycles (at +40 °C)	> 10^{10}
Read/write distance (S_g)	See section "Field data (Page 35)."
Mounting on metal	Yes
Mounting in metal	yes, with 10 mm clearance all round
Power supply	inductive power transmission (without battery)

Degree of protection to EN 60529	IP68 [1] IPx9K [2]
Pressure resistance	• low pressure resistant [3] • high pressure resistant (see degree of protection IPx9K)
Shock according to EN 60721-3-7, Class 7M3 Total shock response spectrum, Type II	50 g [4]
Vibration-resistant to EN 60721-3-7, Class 7M3	20 g [4]
Torsion and bending load	Not permissible
Enclosure	
• Dimensions (D x H)	• 30 mm (+0.2/-0.5) x 8 mm (-0.5)
• Color	• Black
• Material	• Plastic PPS, silicone-free
Fixing	Countersunk screw, thread M4 [5]
Tightening torque	≤ 1 Nm
Ambient temperature	
• During operation	• -25 °C to +85 °C
• Transport and storage	• -40 °C to +100 °C
Weight	Approx. 10 g

1) 2 hours, 2 m, +20 °C

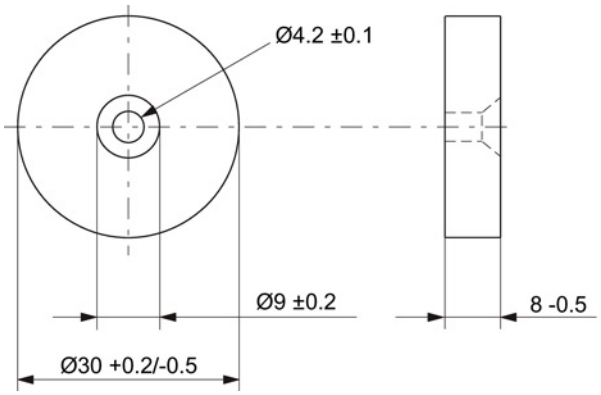
2) steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C

3) vacuum dryer: up to 20 mbar

4) The values for shock and vibration are maximum values and must not be applied continuously.

5) To prevent it loosening, secure the screw with screw locking varnish.

7.16.5 Dimensional drawing



Dimensions in mm

Figure 7-44 Dimension drawing for MDS D423

7.17 MDS D424

7.17.1 Characteristics

MDS D424	Characteristics	
	Field of application	Production and distribution logistics as well as in assembly and production lines
	Memory	FRAM 2048 bytes gross 2000 bytes net
	Read/write range	See Chapter Field data (Page 35).
	Mounting on metal	Not possible: Recommended distance from metal ≥ 25 mm
	High resistance	Can also be used in a harsh industrial environment without problem
	Standard	Oriented according to ISO standard 15693

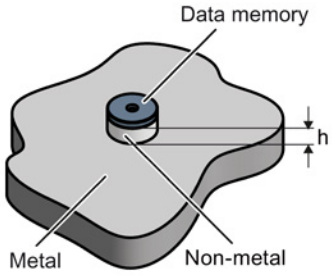
7.17.2 Ordering data

Table 7- 33 Ordering data of MDS D424

	Order number
MDS D424	6GT2600-4AC00

7.17.3 Mounting on metal

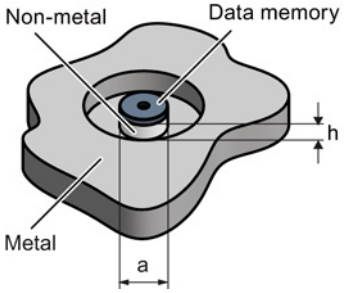
Mounting on metal



h ≥ 25 mm

Figure 7-45 Mounting of the MDS D424 on metal with spacer

Flush-mounting



h ≥ 25 mm

a ≥ 25 mm

Figure 7-46 Flush-mounting of MDS D424 in metal with spacer

Note

If the minimum guide values (h) are not observed, a reduction of the field data results. It is possible to mount the MDS with metal screws (M3 countersunk head screws). This has no tangible impact on the range.

7.17.4 Technical specifications

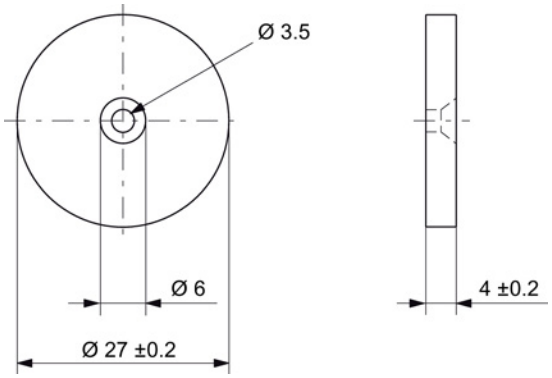
Table 7- 34 Technical data of MDS D424

Memory size	2048 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 40 bytes
• Application memory	• 2000 bytes
Storage technology	FRAM
Memory organization	2048 bytes gross 2000 bytes net
Protocol	ISO 15693
Data retention (at +40 °C)	10 years
MTBF (at +40 °C)	≥ 1.5 x 10^6 hours
Read cycles	Unlimited
Write cycles (at +40 °C)	> 10^{10}
Read/write distance (S_g)	See Chapter Field data (Page 35)
Distance from metal	Min. 25 mm (ca. 30% reduction of the field data)
Multitag capability	Yes

Power supply	Inductive power transmission (without battery)
Degree of protection to EN 60529	IP67
Shock according to EN 60721-3-7, Class 7M3 Total shock response spectrum, Type II	100 g [1]
Vibration-resistant to EN 60721-3-7, Class 7M3	20 g [1]
Torsion and bending load	Not permissible
Enclosure	
• Color	• Black
• Material	• Epoxy casting resin
• Dimensions (D x H) in mm	• 27(±0.2) x 4(±0.2)
Fixing	M3 screw, adhesive
Tightening torque at +20 °C	≤ 1 Nm
Ambient temperature	
• During operation	• -25 °C to +85 °C
• Transport and storage	• -40 °C to +100 °C
Weight, approx.	5 g

[1] The values for shock and vibration are maximum values and must not be applied continuously.

7.17.5 Dimension drawing



Dimensions in mm

Figure 7-47 Dimension drawing of MDS D424

7.18 MDS D425

7.18.1 Characteristics

MDS D425	Characteristics	
	Field of application	Compact and rugged ISO transponder; suitable for screw mounting Use in assembly and production lines in the powertrain sector; ideal for mounting on motors, gearboxes, and workpiece holders
	Memory	FRAM 2048 bytes gross 2000 bytes net
	Read/write range	See section "Field data (Page 35)".
	Mounting on metal	Yes
	High resistance	Rugged packaging of the MDS D425; can therefore also be used under extreme environmental conditions without problem
	Standard	Oriented according to ISO-15693

7.18.2 Ordering data

Table 7- 35 Ordering data of MDS D425

	Order number
MDS D425	6GT2600-4AG00

7.18.3 Application example of MDS D425

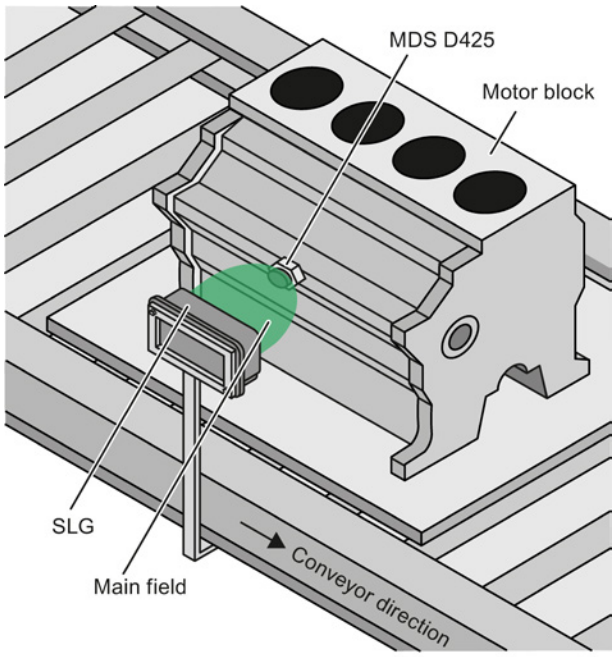


Figure 7-48 Application example

7.18.4 Technical specifications

Table 7- 36 Technical data of MDS D425

Memory size	2048 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 40 bytes
• Application memory	• 2000 bytes
Storage technology	FRAM
Memory organization	2048 bytes gross 2000 bytes net when using the OPT area, 16 bytes of this must be subtracted in 8 byte blocks
Protocol	ISO 15693
Data retention (at +40 °C)	10 years
MTBF	≥ 2 ° 10^6 h
Data rate read/write	approx. 2 ms/byte
Bulk detection/multitag capability	Yes
Read cycles	unlimited

Write cycles at +40 °C, typical	> 10^{10}
Read/write distance (S_g)	See section "Field data (Page 35)."
Distance from metal	Can be mounted on metal
Power supply	Inductive power transmission (without battery)
Degree of protection according to EN 60529	IP68 [1] IPx9K [2]
Shock, tested in accordance with IEC 68-2-27	50 g [3]
Vibration, tested in accordance with IEC 68-2-6	20 g [3]
Torsion and bending load	not permitted
Housing	
• Color	• Black
• Material	• Plastic PA 6.6 GF; thread: Stainless steel
• Dimensions (D x H)	• Wrench size 22 mm x 10 mm (±1) (without thread), thread M6
MDS fixing	Screws, tightening torque (at room temperature) ≤ 6 Nm
Ambient temperature	
• During operation	• -25 °C ... +85 °C
• During transportation and storage	• -40 °C ... +125 °C
Weight	Approx. 35 g

1) 2 hours, 2 m, +20 °C

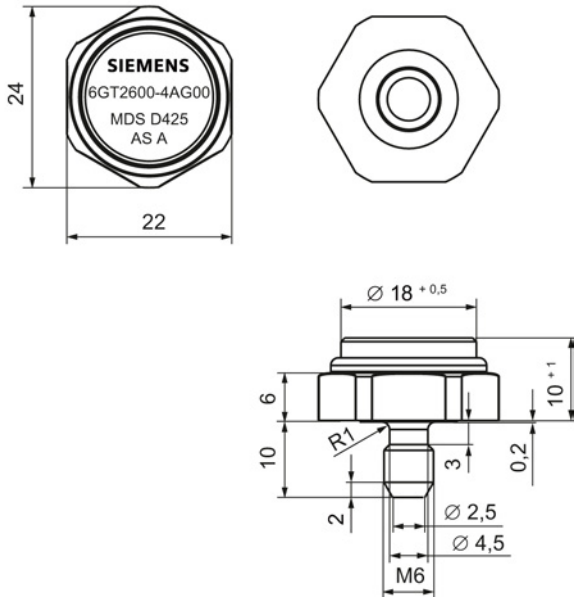
2) steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C

3) The values for shock and vibration are maximum values and must not be applied continuously.

Note

It is recommended that a test is performed in critical applications.

7.18.5 Dimension drawing



Dimensions in mm

Figure 7-49 Dimension drawing of MDS D425

7.19 MDS D426

7.19.1 Characteristics

MDS D426	Characteristics	
	Field of application	Compact and rugged ISO transponder; suitable for identification of transport units in production-related logistics; can also be deployed in harsh conditions
	Memory	FRAM 2048 bytes gross 2000°bytes net
	Read/write range	See Chapter Field data (Page 35)
	Standard	Oriented according to ISO standard 15693

7.19.2 Ordering data

Table 7- 37 Ordering data of MDS D426

	Order number
MDS D426	6GT2600-4AH00

7.19.3 Technical specifications

	6GT2600-4AH00
Product type designation	MDS D426
Memory size	2048 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 40 bytes
• Application memory	• 2000 bytes
Storage technology	FRAM
Memory organization	FRAM 2048 bytes / gross 2000 bytes net Only for RF300: When using the OPT area, 16 bytes of it must be subtracted in 8 byte blocks
Protocol	ISO 15693

	6GT2600-4AH00
Data retention (at +40 °C)	10 years
MTBF	≥ 2 ° 10^6 h
Data transmission rate for read and write	approx. 2 ms/byte
Bulk detection/multitag capability	Yes
Read cycles	unlimited
Write cycles (at +40 °C, typical)	> 10^{10}
Read/write distance (S_g)	See section Field data (Page 35)
Distance from metal	≥ 25 mm (approx. 25 % reduction of the field data)
Power supply	Inductive power transmission (without battery)
Degree of protection according to EN 60529	IP68 [1]
Shock, tested in accordance with IEC 68-2-27	50 g [2]
Vibration, tested in accordance with IEC 68-2-6	20 g [2]
Torsion and bending load	not permitted
Housing	
• Color	• Black
• Material	• Plastic PA 6.6 GF
• Dimensions (D × H)	• 50 (±0.3) × 3.6 (±0.2) mm
• Attachment hole (D)	• 5.1 (±0.2) mm
MDS fixing	M4 screws, tightening torque (at room temperature) ≤ 1 Nm, adhesive
Ambient temperature	
• During operation	• -25 °C ... +85 °C
• During transportation and storage	• -40 °C ... +100 °C
Weight	Approx. 13 g

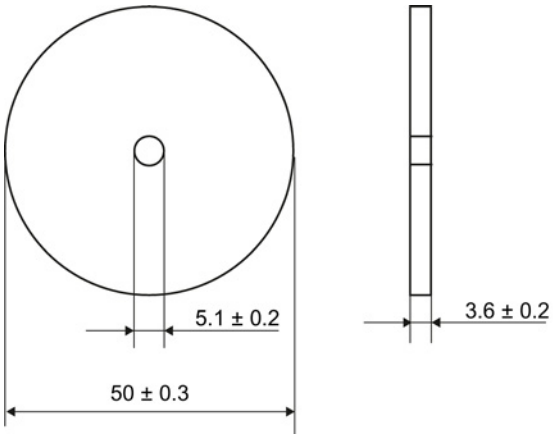
[1] 2 hours, 2 m, +20 °C

[2] The values for shock and vibration are maximum values and must not be applied continuously.

Note

It is recommended that a test is performed in critical applications.

7.19.4 Dimension drawing



Dimensions in mm

Figure 7-50 Dimension drawing of MDS D426

7.20 MDS D428

7.20.1 Characteristics

MDS D428	Characteristics	
	Field of application	Compact and rugged ISO transponder; suitable for screw mounting Use in assembly and production lines in the powertrain sector
	Memory	FRAM 2048 bytes gross 2000 bytes net
	Read/write range	See Chapter Field data (Page 35).
	Mounting on metal	Yes
	High resistance	Rugged packaging of the MDS D428; can therefore also be used under extreme environmental conditions without problem
	Standard	Oriented according to ISO-15693

7.20.2 Ordering data

Table 7- 38 Ordering data of MDS D428

	Order number
MDS D428	6GT2600-4AK00

7.20.3 Application example of MDS D428

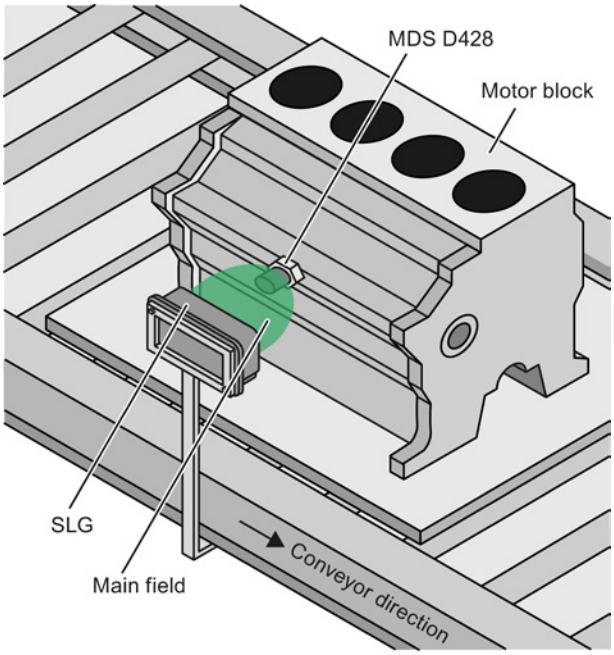


Figure 7-51 Application example

7.20.4 Technical specifications

Table 7- 39 Technical data of MDS D428

Memory size	2048 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 40 bytes
• Application memory	• 2000 bytes
Storage technology	FRAM
Memory organization	2048 bytes gross 2000 bytes net
Protocol	ISO 15693
Data retention (at +40 °C)	10 years
Bulk detection/multitag capability	Yes
Read cycles	unlimited
Write cycles at +40 °C, typical	> 10^{10}
Read/write distance (S_g)	See section Field data (Page 35)
Distance from metal	Can be mounted on metal
Power supply	Inductive power transmission (without battery)

Degree of protection according to EN 60529	IP68 [1] IPx9K [2]
Shock, tested in accordance with IEC 68-2-27	50 g [3]
Vibration, tested in accordance with IEC 68-2-6	20 g [3]
Torsion and bending load	not permitted
Housing	
• Color	• Black
• Material	• Plastic PA 6.6 GF; thread: Stainless steel
• Dimensions (D x H) in mm	• 18(±1) x 20(±1) (without thread), thread M8
MDS fixing	Screws, tightening torque (at room temperature) ≤ 8 Nm
Ambient temperature	
• During operation	• -25 °C to +85 °C
• During transportation and storage	• -40 °C to +125 °C
Weight, approx.	35 g

[1] 2 hours, 2 m, +20 °C

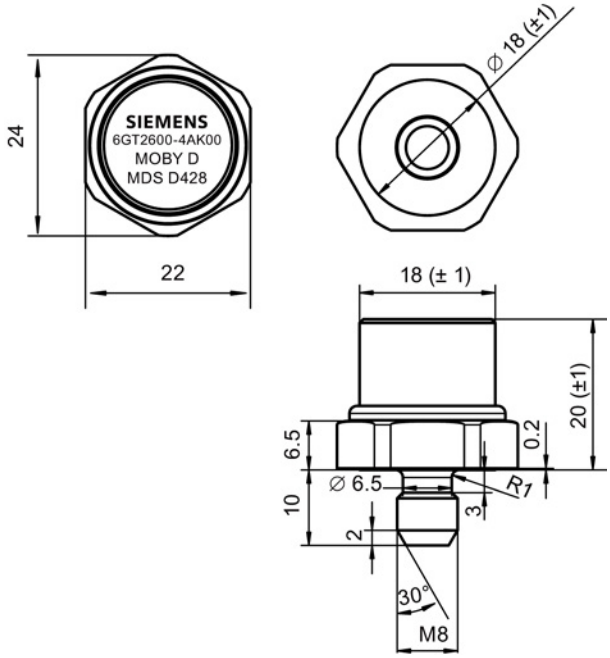
[2] steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C

[3] The values for shock and vibration are maximum values and must not be applied continuously.

Note

It is recommended that a test is performed in critical applications.

7.20.5 Dimension drawing



Dimensions in mm

Figure 7-52 Dimension drawing of MDS D428

7.21 MDS D460

7.21.1 Characteristics

MDS D460	Characteristics	
	Field of application	Identification in small assembly lines
	Memory	FRAM 2048 bytes gross 2000°bytes net
	Read/write range	See Chapter Field data (Page 35).
	Mounting on metal	With spacer: Recommended distance from metal ≥ 10 mm
	High resistance	Can also be used in a harsh industrial environment
	Standard	Oriented according to ISO standard 15693

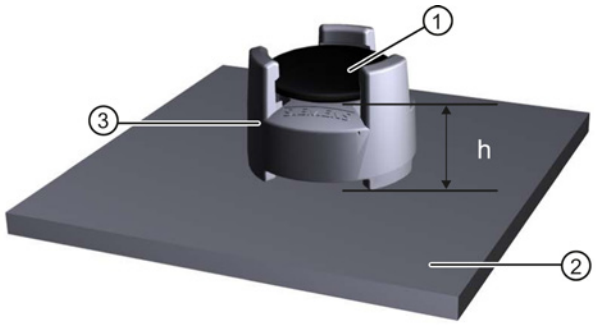
7.21.2 Ordering data

Table 7- 40 Ordering data of MDS D460

	Order number
MDS D460	6GT2600-4AB00
Spacer for MDS D160 / MDS D460	6GT2690-0AG00

7.21.3 Mounting on metal

Mounting option on metal with spacer



① Transponder
② Metal
③ Spacer
h ≥ 10 mm

Figure 7-53 Mounting of the MDS D460 on metal with spacer

Note

If the minimum guide values (h) are not observed, a reduction of the field data results.
In critical applications, it is recommended that a test is performed.

Flush-mounting

Flush-mounting of the MDS D460 in metal is not permitted!

7.21.4 Technical specifications

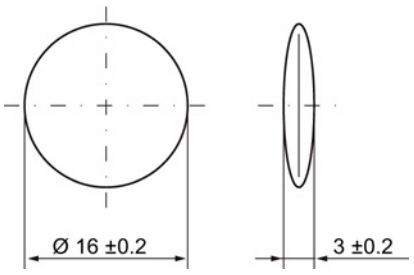
Memory size	2048 bytes
Memory configuration	
• Serial number	• 8 bytes (fixed code)
• Configuration memory	• 40 bytes
• Application memory	• 2000 bytes
Storage technology	FRAM
Memory organization	2048 bytes gross 2000 bytes net Only for the RF300: When using the OPT area, 16 bytes of it must be subtracted in 8 byte blocks
Protocol	ISO 15693
Data retention (at +40 °C)	10 years
MTBF (at +40 °C)	2 x 10^6 hours
Bulk detection/multitag capability	Yes
Read cycles	Unlimited
Write cycles (at +40 °C, typical)	> 10^{10}
Read/write distance (S_g)	See Chapter Field data (Page 35)
Distance from metal	≥ 10 mm (approx. 25% reduction of the field data)
Power supply	Inductive power transmission (without battery)
Degree of protection to EN 60529	IP67 IPx9K [1]
Shock, tested in accordance with IEC 68-2-27	50 g [2]
Vibration, tested in accordance with IEC 68-2-6	20 g [2]
Torsion and bending load	Not permissible
Enclosure	
• Color	• Black
• Material	• Epoxy casting resin
• Dimensions (D x H) in mm	• 16 (±0.2) x 3.0 (±0.2)
MDS fixing	Adhesion, spacer
Ambient temperature	
• During operation	• -25 °C to +85 °C permanent
• Transport and storage	• -40 °C to +100 °C
Weight, approx.	3 g

[1] steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C

[2] The values for shock and vibration are maximum values and must not be applied continuously.

7.21.5 Dimension drawings

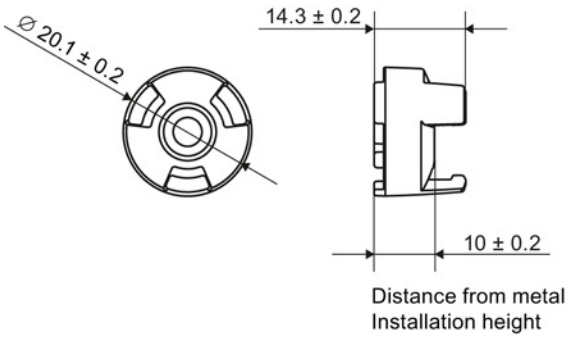
Dimensional drawing of MDS D460



Dimensions in mm

Figure 7-54 Dimensional drawing of MDS D460

Dimensional drawing of spacer



Dimensions in mm

Figure 7-55 Dimensional drawing of spacer

Accessories

8

8.1 Antenna splitter

Area of application

Antenna splitter	Characteristics	
	Area of application	Designed for distributed mounting of antennas in warehouses, logistics and distribution
	Readers that can be connected	RF290R
	Number of antennas that can be connected	max. 4 (by cascading)
	Connectable antennas	• ANT D5 • ANT D6 • ANT D10
	Degree of protection	IP65

The antenna splitter is a power distributor with electrical isolation between the input (IN) and the two outputs (OUT1, OUT2). At the operating frequency of 13.56 MHz, the impedance at all inputs and outputs is 50 ohms.

The device is used to connect 2 to 4 antennas to a reader. Gate, C and tunnel arrangements are therefore possible (see section "Configuration options").

Ordering data

Table 8- 1 Ordering data for the antenna splitter

	Order number
Antenna splitter (incl. one antenna connecting cable 3.3 m)	6GT2690-0AC00

Table 8- 2 Ordering data - accessories - antenna splitter

		Order number
Antenna cable	Length 3.3 m	6GT2691-0CH33
	Length 10.5 m	6GT2691-0CN10
Antenna cable extension	Length 7.2 m	6GT2691-0DH72

Technical specifications

Table 8- 3 Technical specifications for antenna splitter

Technical specifications	
Max. input power	10 W
Transmission frequency	13.56 MHz
Power supply	None
Housing dimensions (L x W x H)	160 x 80 x 40 mm (without connector)
Color	Anthracite
Material	Plastic PA 12
Connector (inputs and outputs)	TNC connector
Securing	2 x M5 screws
Ambient temperature	
• During operation	• -25 °C ... +65 °C
• During transportation and storage	• -25 °C ... +75 °C
MTBF	3.0 x 10^5 hours
Degree of protection according to EN 60529	IP65 (UL: for indoor use only)
Shock resistant according to EN 60721-3-7 Class 7M2 Total shock response spectrum Type II	30 g
Vibration according to EN 60721-3-7 Class 7M2	1 g (9 ... 200 Hz) / 1.5 g (200 ... 500 Hz)
Weight, approx.	400 g
Approval	CE UL

8.2 Antenna multiplexer SIMATIC RF260X

8.2.1 Characteristics

The SIMATIC RF260X antenna multiplexer can be used to operate up to six antennas on one reader.

SIMATIC RF260X antenna multiplexer	Characteristics	
	Area of application	Designed for distributed mounting of antennas in warehouses, logistics and distribution
	Readers that can be connected	RF290R
	Number of antennas that can be connected	maximum of 6
	Connectable antennas	• ANT D5 • ANT D6 • ANT D10
	Degree of protection	IP65

8.2.2 Ordering data

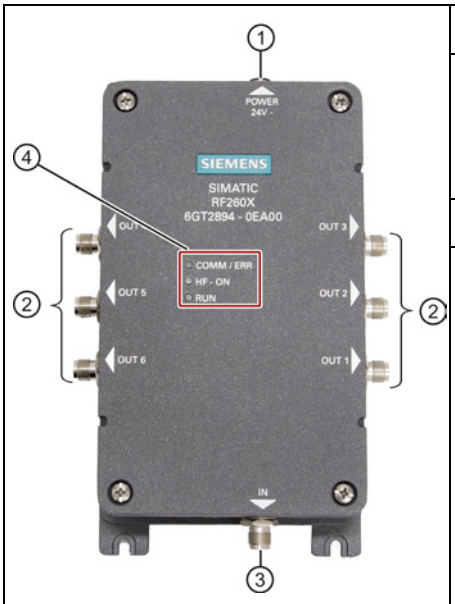
Table 8- 4 SIMATIC RF260X ordering data

	Order number
SIMATIC RF260X Antenna multiplexer incl. antenna connecting cable 0.4 m	6GT2894-0EA00

Table 8- 5 SIMATIC RF260X accessories ordering data

		Order number
24 V connecting cable, 5 m		6GT2491-1HH50
RF290R		6GT2821-0AC12
Wide-range power supply unit for SIMATIC RF-systems (100 - 240 V AC / 24 V DC / 3 A) with 2 m connecting cable with country-specific plug		EU: 6GT2898-0AA00 UK: 6GT2898-0AA10 US: 6GT2898-0AA20
RS-232 connecting cable, with 4-pin M12 connector for 24 V for connection to the wide-range power supply unit, 5 m		6GT2891-4KH50
ANT D5 incl. antenna connecting cable (3.3 m)		6GT2698-5AA10
ANT D6 incl. antenna connecting cable (3.3 m)		6GT2698-5AB00
ANT D10 incl. antenna connecting cable (3.3 m)		6GT2698-5AF00
Antenna cable	3.3 m	6GT2691-0CH33
	10.5 m	6GT2691-0CN10
Antenna cable extension	7.2 m	6GT2691-0DH72

8.2.3 Description



①	24 V DC power supply		
②	Antenna connections OUT 1 to OUT 6 with LEDs		
	Color	Status LED	
	Yellow	Lit when the corresponding antenna output is active.	
③	SLG antenna connection "IN"		
④	LEDs		
	LED	Color	Status LED
	COMM / ERR	Red	• Flashes when the RF260X receives a signal from the SLG. (Only with commands, directly on the RF260X) • Lit when the multiplexer has detected an error on the output (e.g. non-terminated antenna cable, defective antenna cable)
	HF - ON	Green	Lit when an HF signal is applied to the "IN" socket ③
	RUN	Green	Flashes when the RF260X is in the normal operating state.

8.2.4 Principle of operation

You can operate up to six antennas on one reader by using the multiplexer RF260X. The data is processed sequentially.

Antenna switchover is performed in time-multiplex mode, so by connecting several antennas together, the processing time / activation time per antenna is lengthened accordingly.

8.2.5 Connectors

- **Power supply**

Pin	Pin, casing side 4-pin M12	Assignment RF260X
 Plan view	1	Ground (0 V)
	2	+ 24 V
	3	+ 24 V
	4	Ground (0 V)

- **Reader connector ③**

Figure 8-1 Reader connector

If a longer antenna cable is required between the RF290R and SIMATIC RF260X multiplexer, a 7.2 m long cable (e.g. 6GT2691-0DH72) must be used to extend it, see Ordering data (Page 241).

The excess length must then be rolled up bifilar and fastened to minimize interference from external sources.

- **Antenna outputs ② (OUT 1 to OUT 3 / OUT 4 to OUT 6)**

8.2.6 Configuration

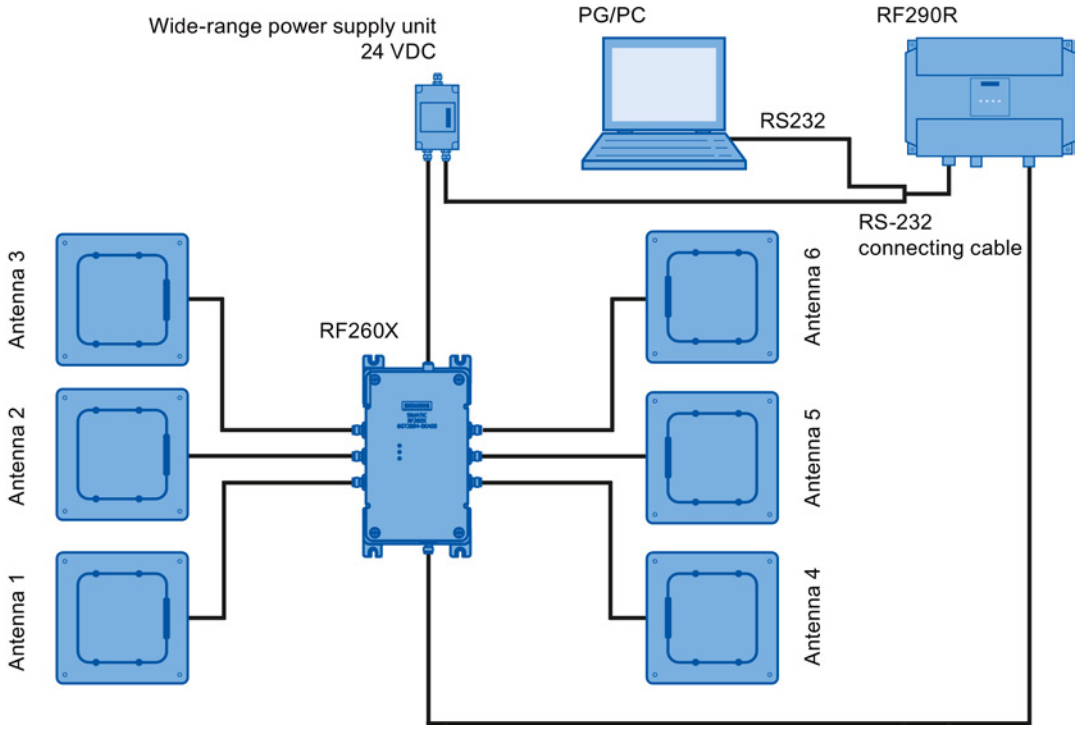


Figure 8-2 Configuration example with ANT D5

8.2.7 Parameterization

Parameter settings can be performed using the tool "RF290R-Set" (V9.5.2).

This tool is primarily used for parameterization and commissioning, and is not designed for productive operation.

The relevant parameters of the RF260X can be set in the "Configuration" menu under "SystemParameters > CFG15: Antenna Multiplexing" ①

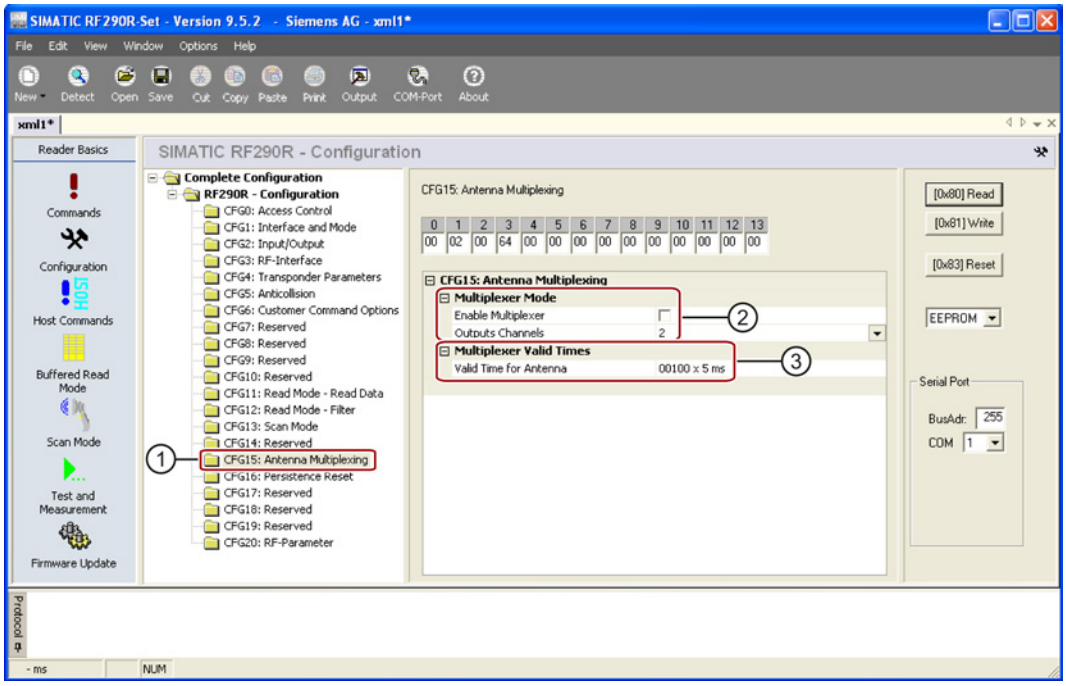


Figure 8-3 Menu "Configuration" MOBYDSet"

- For operation with RF260X, you need to activate the "Multiplexing" function ②.
- The number of occupied channels must be specified under "Number of Output Channels" ②.
- In "Multiplexer Valid Times" ③, the maximum time available for the antenna to read a transponder is entered. Following this time, the device switches to the next antenna automatically. If the read was successful, the time may be significantly shorter than specified here.

Note

Changing the parameter assignment

- Note that if you change the parameter settings of the reader or the RF260X in scanner mode, this may lead to frame collisions. These collisions result when the frame is sent while a transponder is present.
- The "Transponder response time" (setting: "CFG2: COM interface") during operation of the RF260X must be higher than the total delay time for all the connected antennas (CFG15: MUX-VALD-TIME × Number of Output Channels ≤ Transponder Response Time)

8.2.8 RF260X commands

Using the tool "RF290R-Set" (V9.5.2), certain commands can also be sent to the RF260X. In the "Commands" menu under "RF260X", the following commands can be sent:

- Detect (detection of the RF260X by the reader)
- Channel Select (set to a static channel)
- CPU-Reset (restart the RF260X software)
- Software Version (read out software and hardware versions)

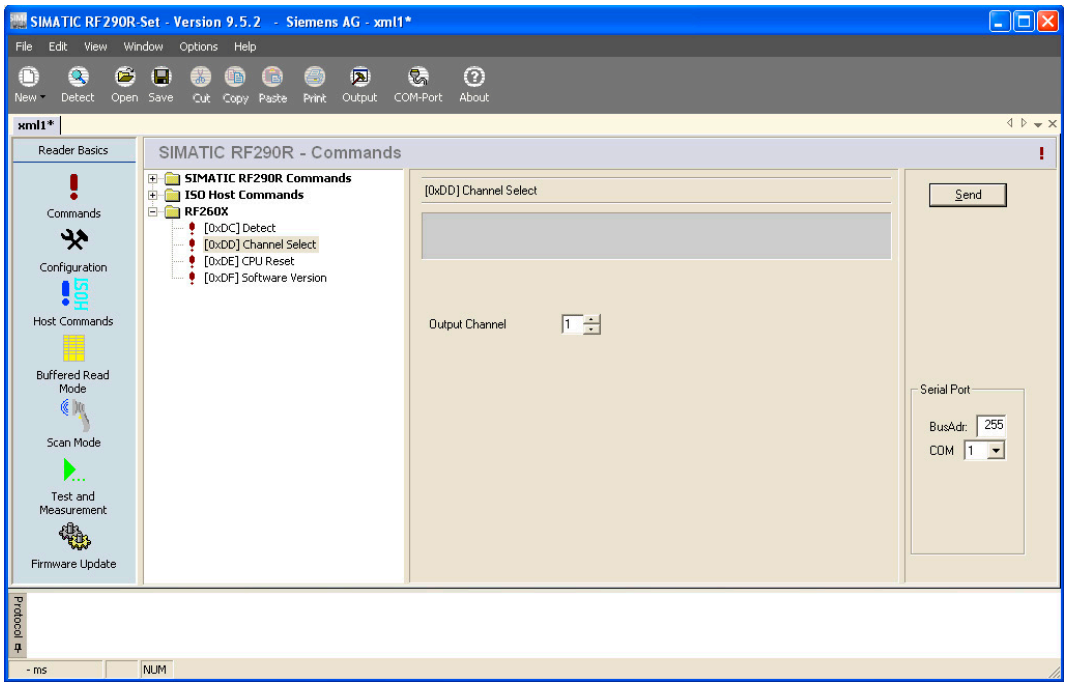


Figure 8-4 Sending commands from the "RF290R-Set" tool

8.2.9 Technical specifications

Technical specifications	
Max. write/read distance ANT ↔ Transponder (S_g)	See manual for the relevant antenna
Number of channels	
• Input channels	• 1
• Output channels	• 6
Impedance	50 ohm
Power supply	24 V (± 10 %)
Current consumption	max. 200 mA
Dimensions (L x W x H)	240 x 150 x 70 mm
Length of the connecting cable	0.4 m
Color	Anthracite
Material	Aluminum die-casting
Plug-in connections	• Power supply: Four-pole M12 / 4 pole round connector • Reader antenna connector: Single-pole TNC socket • Antenna connections: 6 x TNC socket
Max. power (reader input, or per antenna)	8 W
Shock resistant according to EN 60721-3-7 Class 7M2 Total shock response spectrum Type II	1 g
Vibration according to EN 60721-3-7 Class 7M2	1.5 g (5 to 500 Hz)
Securing	4 M5 screws
Tightening torque (at room temperature)	≤ 5 Nm
Ambient temperature	
• During operation	• -20 °C ... +55 °C
• During transportation and storage	• -25 °C ... +70 °C
MTBF	2.5 x 10^6 hours
Degree of protection according to EN 60529	IP65
Weight, approx.	1.8 kg
Approvals	CE / FCC / IC

8.2.10 Dimensional drawing

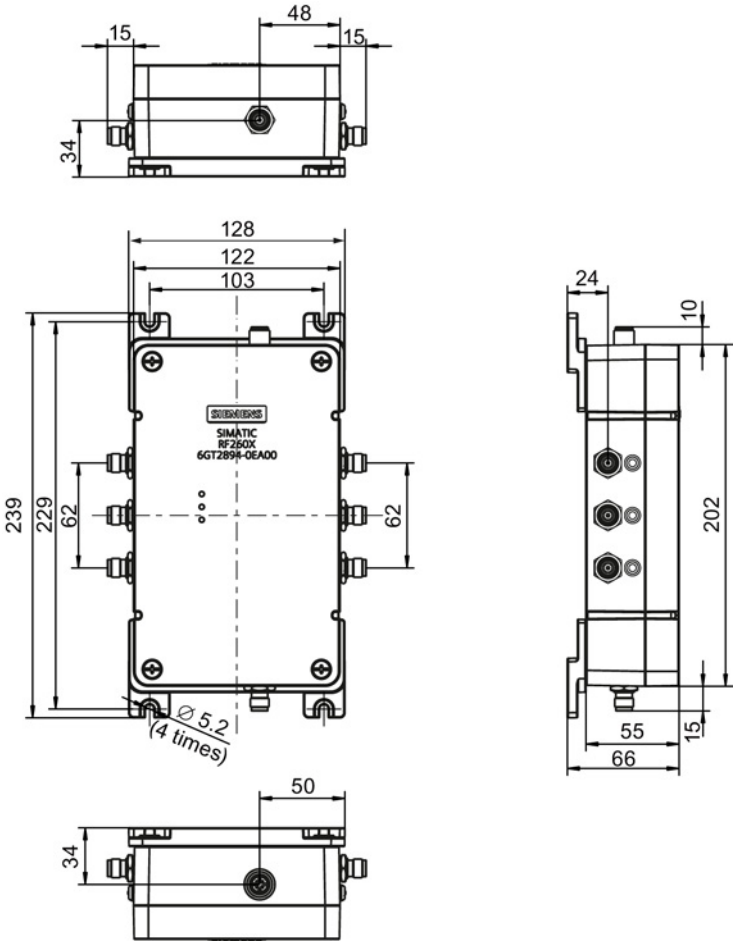


Figure 8-5 RF260X dimension drawing

8.3 Wide-range power supply unit for SIMATIC RF systems

8.3.1 Features

Wide-range power supply unit for SIMATIC RF systems	
	① DC output 1 ② DC output 2 ③ Network connector
Characteristics	
• Wide-range input ③ for use worldwide • Dimensions without mains cable: 175 x 85 x 35 mm • Dimensions including mains cable: 250 x 85 x 35 mm • CE-compliant (EU and UK versions) • UL-certified for US and Canada (US version) • Mechanically and electrically rugged design • Secondary side ①, ②: 24 VDC / 3 A • Short-circuit and no-load stability • Suitable for frame mounting • 3 versions for use in the EU, UK, US	

Description

The wide-range power supply unit for SIMATIC RF systems is a universal compact power supply and provides the user with an efficient, cost-saving solution for many different mid-range power supply tasks.

The primary switched power supply is designed for use on single-phase AC systems. The two DC outputs (sockets) are connected in parallel and protected by a built-in current limiting circuit against overload and short-circuits.

The device is vacuum-cast and prepared for Safety Class 2 applications. The EU and UK versions satisfy the low-voltage guideline as well as the current EU standards for CE conformity. Furthermore, the US version has been UL-certified for the US and Canada.

8.3.2 Scope of supply

- Wide-range power supply unit for SIMATIC RF systems
- 2 m mains cable (country-specific)
- Protective cover for flange outlet
- Operating Instructions

8.3.3 Ordering data

Table 8- 6 Ordering data for wide-range power supply unit

	Order number
Wide-range power supply unit for SIMATIC RF systems (100 - 240 VAC / 24 VDC / 3 A) with 2 m connecting cable with country-specific plug	EU: 6GT2898-0AA00 UK: 6GT2898-0AA10 US: 6GT2898-0AA20
24 V-connecting cable, length 5 m	6GT2491-1HH50

8.3.4 Safety Information

⚠ WARNING

Danger to life

It is not permitted to open the device or to modify the device.

The following must also be taken into account:

- Failure to observe this requirement shall constitute a revocation of the CE approval, UL certification for the US and Canada as well as the manufacturer's warranty.
- For installation of the power supply, compliance with the DIN/VDE requirements or the country-specific regulations is essential.
- The field of application of the power supply unit is limited to "Information technology equipment" within the scope of validity of the EN 60950/VDE 0805 standard.
- When the equipment is installed, it must be ensured that the mains socket outlet is freely accessible.
- The housing can reach a temperature of +25 °C during operation without any adverse consequences. It must, however, be ensured that the power supply is covered in the case of a housing temperature of more than +25°C to protect persons from contact with the hot housing. Adequate ventilation of the power supply must be maintained under these conditions.

NOTICE
Area of application of the wide-range power supply unit The wide-range power supply unit may only be used for SIMATIC products in the specifically described area of application and for the documented purpose.

If the wide-range power supply unit for SIMATIC RF systems is used for an end product other than one from the SIMATIC RF family, the following must be taken into account:

- The electric strength test of the end product is to be based upon a maximum working voltage of: Transition from primary to SELV: 353 VDC, 620 Vpk
- The following secondary output circuits are SELV (low voltage; SELV = Safety Extra Low Voltage): all
- The following secondary output circuits are at non-hazardous energy levels: all
- The power supply terminals and/or connectors are suitable for field wiring if terminals are provided.
- The maximum investigated branch circuit rating is: 20 A
- The investigated pollution degree is: 2

⚠ WARNING
Liability If the wide-range power supply unit for SIMATIC RF systems is connected to an end product other than one from the SIMATIC RF family, the end user is responsible and liable for operation of the system or end product that includes the wide-range power supply unit for SIMATIC RF systems.

NOTICE
Restriction to the approval of the wide-range power supply The SIMATIC RF290R reader may only be operated with power supplies that have received KETI approval. There is currently no KETI approval for the wide-range power supply (6GT2898-0AAx0), which is why it may not be operated in South Korea. To be able to operate the SIMATIC RF290 reader in South Korea, use only a power unit that meets the following requirements: 230 VAC, 24 VDC / 3 A; KC safety approved

8.3.5 Connecting

- There are three different (country-specific) mains cables for the EU, UK and US.
  The appropriate mains cable must be connected to the primary input of the power supply.

Note

It is only permissible to insert or remove the mains cable when the power supply is de-energized.

- The wide-range power supply unit has total insulation (Safety Class 2), IP65
- It can be mounted using four fixing holes.

8.3.6 Technical specifications

General technical specifications		
Insulation stability (prim./sec.) $U_{ins\ p/s}$		3.3 kV_{AC}
Insulation resistance R_{ins}		>1 GΩ
Leakage current I_{leak}	U_{in} = 230 V_{AC}, f = 50 Hz	< 200 µA
Safety class (SELV)	Designed for installation in devices of Safety Class 2	
Mains buffering t_h	U_{in} = 230 V_{AC}	≥ 50 ms
Ambient temperature		-25 °C ... +55 °C
Surface temperature	Module top, center	max. 96 °C
Storage temperature		-40 °C ... +85 °C
Self-heating on full-load		max. 45 K
Interference immunity ESD HF fields Burst Surge HF injection Mains quality test	EN 61000-4-2, 4-3 to 4-6, 4-11	 Air discharge: 15 kV 10 V/m symmetrical: 2 symmetrical: 1 10 V_{rms}
Cooling		Free convection
Dimensions L x W x H		175 mm x 85 mm x 35 mm
Weight		720 g
Housing / casting		UL 94-V0
Power supply class	according to CSA	Level 3
Degree of protection	IP65	
MTBF in years		255

Technical specifications - input		
Rated input voltage U_{in}	EN 60950 / UL 60950	100 to 240 VAC 120 to 353 VDC
Input frequency f_{in}		50/60 Hz
Radio interference level		EN 55011/B
Switching frequency f_{sw}		approx. 70 kHz typ.
Length of cable		2 m

Technical specifications - output		
Output voltage tolerance ΔU_{out}	U_{in} = 230 V_{AC}	$U_{out\ nom}$ ≤ +2 %/-1 %
Overvoltage protection		$U_{out\ nom}$ +20 % typ.
Noise ΔU_{LF}	U_{in} = min., BW: 1 MHz	≤ 1 % U_{out}
Noise ΔU_{HF}	U_{in} = min., BW: 20 MHz	≤ 2 % U_{out}
Regulation		
• Line regulation	• U_{in} = min./max.	• ≤ 1,0 %
• Load regulation	• I_{out} = 10...90...10 %	• ≤ 1,0 %
Short-circuit current I_{max}	I_{nom} = 4 A (+50 °C)	105 ... 130 % I_{nom}
Settling time t_R load variations	I_{out} = 10 ... 90 ... 10 %	< 5 ms
Temperature coefficient ε	T_A = -25 °C to +70 °C	0.01 %/K
Overload behavior P_{over}		Constant current
Short-circuit protection/ No-load response		Continuous/no-load stability
Derating	T_A > +50 °C to +70 °C	max. 2 %/K
Connector type		M12, 4-pin; two sockets

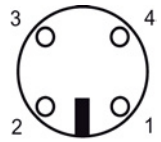
Technical specifications - initial configurations

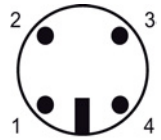
Input	Outputs U1 = U2	ILoad = I1 + I2	Efficiency (%)	Remarks
110 VAC	24 VDC	0 A		No-load stability
110 VAC	24 VDC	3 A	≥ 88	
220 VAC	24 VDC	0 A		No-load stability
220 VAC	24 VDC	3 A	≥ 90	

Technical specifications - standards complied with		
Designation	**Standard**	**Values**
Electrical safety	EN 60950 / UL 60950 / CAN/CSA 22.2 950, 3 Edition	
Conducted interference	EN 61000-6-3 EN 55011	Class B
Emission	EN 61000-6-3 EN 55011	Class B

All values are measured at full-load and at an ambient temperature of +25 ℃ (unless specified otherwise).

8.3.7 Pin assignment of DC outputs and mains connection

DC outputs	Assignment
	(1) Ground (0V)
	(2) +24 V DC
	(3) +24 V DC
	(4) Ground (0V)

Mains connection	Assignment
	(1) 100 to 240 V AC
	(2) n.c.
	(3) 100 to 240 V AC
	(4) n.c.

8.3.8 Dimension drawing

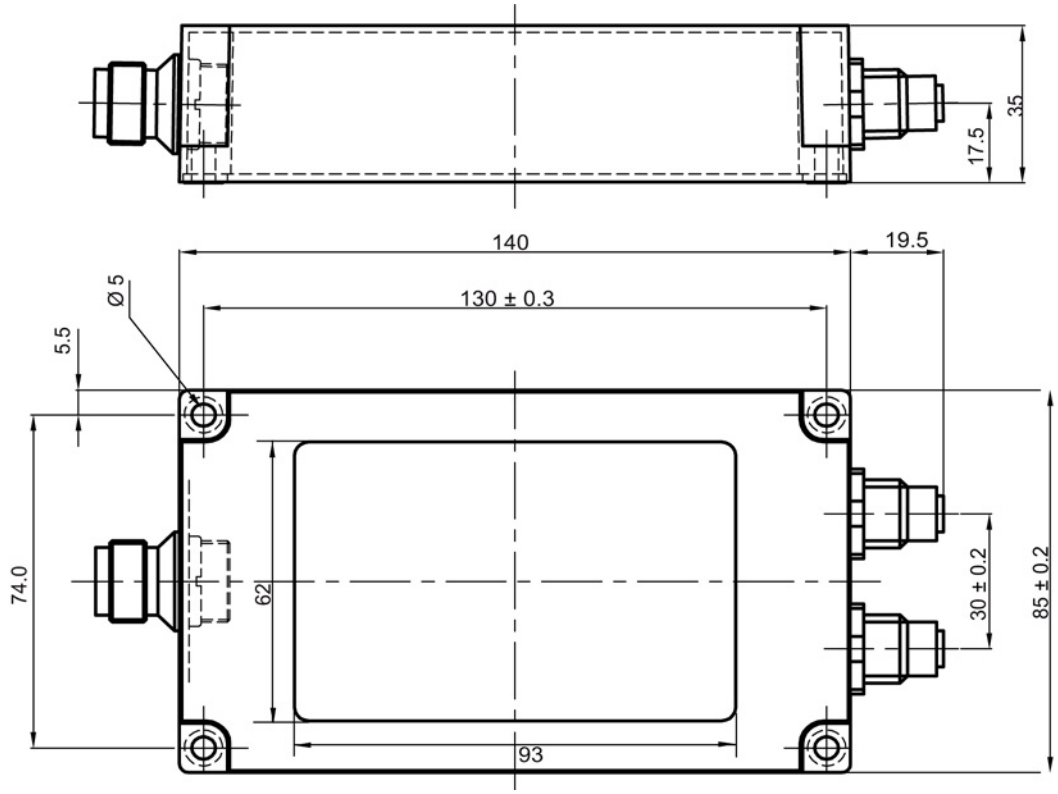


Figure 8-6 Dimension drawing wide-range power supply unit for SIMATIC RF systems (all dimensions in mm)

8.3.9 Certificates and approvals

Table 8- 7 Wide-range power supply unit for SIMATIC RF systems 6GT2898-0AA00 - Europe, 6GT2898-0AA10 - UK

Certificate	Description
CE	CE approval to 2004/108/EC EMC 73/23/EEC LVD

Table 8- 8 Wide-range power supply unit for SIMATIC RF systems 6GT2898-0AA20 - USA

Standard	
c UL us	This product is UL-certified for the US and Canada. It meets the following safety standards: UL 60950-1 - Information Technology Equipment Safety - Part 1: General Requirements CSA C22.2 No. 60950 -1 - Safety of Information Technology Equipment UL Report E 205089

System integration

9

The communication modules (interface modules) are links between the RFID components (reader and transponder) and the higher-level controllers (e.g. SIMATIC S7), or PCs or computers.

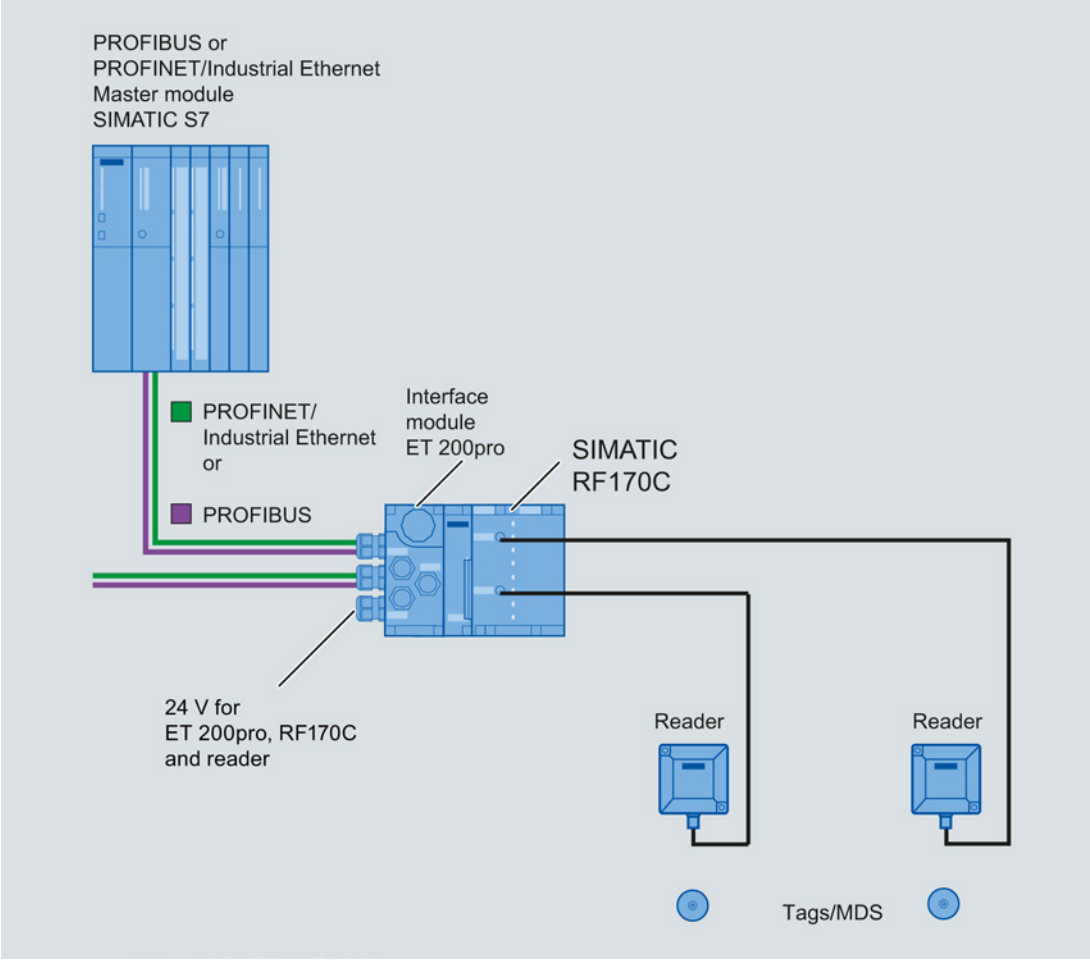


Figure 9-1 Configuration example

Interfacing to the controller

The readers are connected to the controller via the following interface or communications modules:

- ASM 456
- ASM 475
- RF120C

- RF160C
- RF170C
- RF180C
- RF182C
- RFID 181EIP

Function blocks, interface modules/communication modules and readers

Function blocks are used for integration into the SIMATIC. They are used to transfer the input parameters to the reader using the "init_run"(RESET) command.

Interface modules/communication modules and function blocks

The following table shows the most important features of the interface modules/communication modules, as well as the compatible function blocks.

When assigning parameters (HW Config) to the communications and interface modules, MOBY U/D/RF200/RF300/RF600 must be selected.

Table 9- 1 Overview of interface modules/communication modules

ASM/ communications module	Interfaces to the application (PLC)	Interfaces to the reader	Function blocks	Reader connections
ASM 456	PROFIBUS DP-V1	2 x 8-pin connector socket, M12	FB 45	2 (parallel)
ASM 475	S7-300 (central), ET200M (PROFIBUS)	Via screw terminals in front connector	FB 45	2 (parallel)
RF120C	S7-1200 (central)	9-pin D-sub socket	Ident profile	1
RF160C	PROFIBUS DP-V0	2 x 8-pin connector socket, M12	FC 44	2 (parallel)
RF170C	PROFIBUS DP-V1 PROFINET IO	2 x 8-pin connector socket, M12	FB 45	2 (parallel)
RF180C	PROFINET IO	2 x 8-pin connector socket, M12	FB 45	2 (parallel)
RF182C	TCP/IP	2 x 8-pin connector socket, M12	__	2 (parallel)
RFID 181EIP	Ethernet/IP	2 x 8-pin connector socket, M12	__	2 (parallel)

You will find more information on the communications modules in the relevant manuals (http://support.automation.siemens.com/WW/view/en/10805849). For more detailed information on the ASM 475, refer to the RF300 system manual.

System diagnostics

10

10.1 Error codes of the RF200 readers

Note

Validity of the error codes

The following error codes apply only to RF200 readers with an S-422 interface (CM mode)

You can determine the error code in two ways:

- directly on the reader/CM by counting the flashing pattern of the red error LED
- Through the FB45 variable "error_MOBY".

Table 10- 1 Error codes of the RF200 readers

Flashing of red LED on reader	Error code (hexa-decimal)	Description
00	00	no error
02	01	Presence error, possible causes: • The active command was not carried out completely • The transponder left the antenna field while the command was being processed - communication disruption between reader and transponder
05	05	Parameterization error, possible causes: • Unknown command • Incorrect parameter • Function not allowed
06	06	Air interface faulty
12	0C	The transponder memory cannot be written, possible cause: Hardware fault (memory faulty)
13	0D	Error in the specified memory address (access attempted to non-existent or non-accessible memory areas).
19	13	Buffer overflow: Insufficient buffer available in the reader for saving the command
20	14	Major system fault (hardware fault)
21	15	Parameter assignment error: faulty parameter in RESET command
24	18	Only a RESET command is permitted
25	19	Previous command is still active
28	1C	Antenna is already switched off/Antenna is already switched on

Flashing of red LED on reader	Error code (hexa-decimal)	Description
30	1E	Incorrect number of characters in frame
-	1F	Running command cancelled by "RESET" command

Note

Error message when memory area is protected

For transponders with a locked or protected memory area, different error messages can occur following a write command depending on the data carrier type, e.g. MDS D1xx (NXP), D3xx (Infineon), D4xx (Fujitsu): Error 01, 0C

10.2 Diagnostic functions

Further information on RFID diagnostic options can be found in Function Manual FB 45 (http://support.automation.siemens.com/WW/view/en/21738808).

10.2.1 Reader diagnostics with SLG STATUS

The SLG STATUS command can be used to scan the status and diagnostics data of the reader.

SLG STATUS (mode 01), corresponds to UDT 110

Name	Type	Possible values	Comment
hardware	char	(31 to 38 hex) 31 hex 32 hex 33 hex 34 hex 3A hex	Type of hardware = RF260R = RF210/220R = RF240R = RF250R = RF290R
hardware_version	word	 0 to FF hex 0 to FF hex	HW version (reserved) = Version (high byte) = Version (low byte)
loader_version	word	 0 to FF hex 0 to FF hex	Bootstrap loader version: e.g. 3130 (=version 1.0) = Version (high byte) = Version (low byte)
firmware	char	0 to FF hex	FW version : 33 (ASCII : 3 = RF2x0R)

Name	Type	Possible values	Comment
firmware_version	word	 0 to FF hex 0 to FF hex	Firmware version: e.g. 3130 (=version 1.0) = Version (high byte) = Version (low byte)
driver	char	 31 hex	Type of driver 3964R
driver_version	word	 0 to FF hex 0 to FF hex	Driver version: e.g. 3132 (=version 1.2) = Version (high byte) = Version (low byte)
interface	byte	 01 hex 02 hex	Interface type = RS-422 = RS-232
baud	byte	 01 hex 03 hex 05 hex	Baud rate = 19.2 kBd = 57.6 kBd = 115.2 kBd
multitag_SLG	byte	 01 hex	Number of transponders (multitag/bulk) that can be processed in the antenna field = Single tag mode
field_ON_time_SLG	byte	01 hex	ISO transponder (non-specific)
status_ant	byte	 01 hex 02 hex	Status of antenna = Antenna is on = antenna is off
MDS_control	byte	 00 hex 01 hex	Presence status = Operation without presence message = Operation with presence message

Note

Unassigned fields in the UDT are not listed here.

10.2.2 Transponder diagnostics with MDS STATUS

The MDS STATUS command can be used to scan the status data of the transponder that is located within the antenna field.

MDS STATUS for ISO transponder (mode 03) corresponds to UDT 230

Table 10- 2 MDS STATUS for ISO mode

Name	Type	Possible values	Comment
UID	array[1…8] byte	000000000 0000000 hex to FFFFFFFF FFFFFFFF hex	Unique identifier =8 byte UID, MSB first
MDS_type	byte	01 hex 03 hex 04 hex 05 hex 06 hex 07 hex	Tag type (chip manufacturer, designation) = ISO general (non-specific or unknown) = my-d (Infineon), MDS D3xx = MB89R118 (Fujitsu), MDS D4xx = I-Code SLI (NXP), MDS D1xx = Tag-it HFI (Texas Instruments), MDS D2xx = LRI2K (ST)
IC_version	byte	0 to FF hex	Chip version
size	word	0 to FF hex	Memory size in bytes Depending on tag type, e.g. my-d: 992 bytes
lock_state	byte	0 to FF hex	–not used with RF200
block_size	byte	0 to FF hex	Block size of the transponder Depending on tag type, e.g. my-d: 4 bytes
nr_of_blocks	byte	0 to FF hex	Number of blocks Depending on tag type, e.g. my-d: 248

Appendix

A

A.1 Certificates and approvals

Certificate	Description
CE	Conformity with R&TTE directive

Notes on CE marking

The following applies to the system described in this documentation:
The CE marking on a device indicates the corresponding approval:

DIN ISO 9001 certificate

The quality assurance system for the entire product process (development, production, and marketing) at Siemens fulfills the requirements of ISO 9001 (corresponds to EN29001: 1987).

This has been certified by DQS (the German society for the certification of quality management systems).

EQ-Net certificate no.: 1323-01

Certifications for the United States, Canada, and Australia

Safety

One of the following markings on a device is indicative of the corresponding approval:	
	Underwriters Laboratories (UL) per UL 60950 (I.T.E) or per UL 508 (IND.CONT.EQ)
	Underwriters Laboratories (UL) according to Canadian standard C22.2 No. 60950 (I.T.E) or C22.2 No. 142 (IND.CONT.EQ)
	Underwriters Laboratories (UL) according to standard UL 60950, Report E11 5352 and Canadian standard C22.2 No. 60950 (I.T.E) or UL508 and C22.2 No. 142 (IND.CONT.EQ)
	UL recognition mark
	Canadian Standard Association (CSA) per Standard C22.2. No. 60950 (LR 81690) or per C22.2 No. 142 (LR 63533)
NRTL	Canadian Standard Association (CSA) per American Standard UL 60950 (LR 81690) or per UL 508 (LR 63533)

EMC

USA	
Federal Communications Commission Radio Frequency Interference Statement	This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
Shielded Cables	Shielded cables must be used with this equipment to maintain compliance with FCC regulations.
Modifications	Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.
Conditions of Operations	This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CANADA	
Canadian Notice	This Class A digital apparatus complies with Canadian ICES-003.

AUSTRALIA	
	This product meets the requirements of the AS/NZS 3548 Norm.

A.2 Connecting cable

A.2.1 RF2xxR reader (RS-422) with ASM 456 / RF160C / RF170C / RF180C

Connecting cable with straight connector

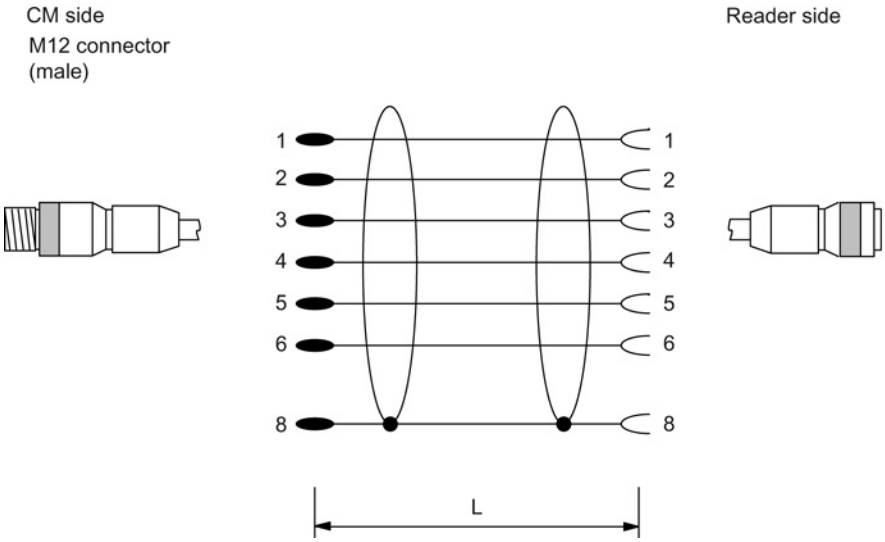


Figure A-1 Connecting cable between ASM 456, RF160C, RF170C, RF180C and RF2xxR reader (RS-422)

Table A- 1 Ordering data

Length L	Order number
2 m	6GT2891-4FH20
5 m	6GT2891-4FH50
10 m	6GT2891-4FN10
20 m	6GT2891-4FN20
50 m	6GT2891-4FN50

Connecting cable with angled connector

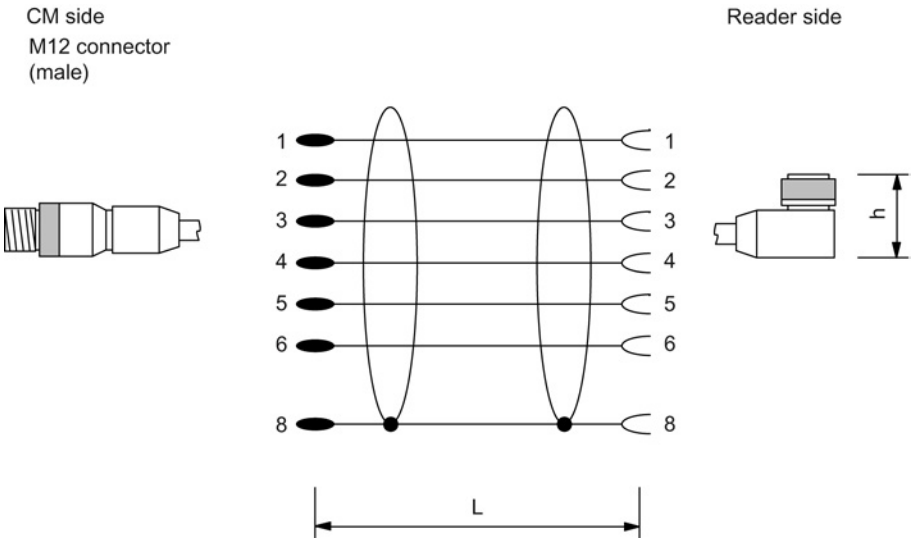


Figure A-2 Connecting cable between ASM 456, RF160C, RF170C, RF180C and RF2xxR reader (RS-422) with angled connector

The angled connector has a height of h = 29 mm and a length of l = 38 mm. Remember that due to the construction, the distance between the edge of the connector and the edge of the reader housing is higher.

The distance between the edge of the connector and the edge of the housing is as follows: RF210R/RF220R = 33 mm, RF240R/RF260R = 36 mm and RF290R = 37 mm.

Table A- 2 Ordering data

Length L	Order number
2 m	6GT2891-4JH20

A.2.2 Reader RF2xxR (RS-422) with ASM 475

Reader connection system

The connecting cable has a length of 2 m (standard) and 5 m. Extensions up to 1000 m are possible with the 6GT2891-4F… plug-in cables.

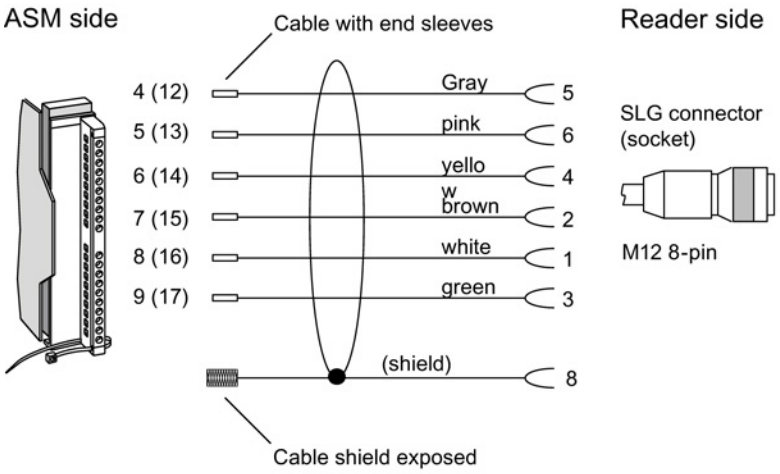


Figure A-3 Connecting cable between the ASM 475 and RF2xx reader (RS-422)

Table A- 3 Ordering data

Length L	Order number
2 m	6GT2891-4EH20
5 m	6GT2891-4EH50

A.2.3 Reader RF240R/RF260R/RF290R (RS232) with PC

With 4-pin power supply connector

The connecting cable (6GT2891-4KH50) is 5 m long.

Special feature of the cable: additional branch for the power supply.

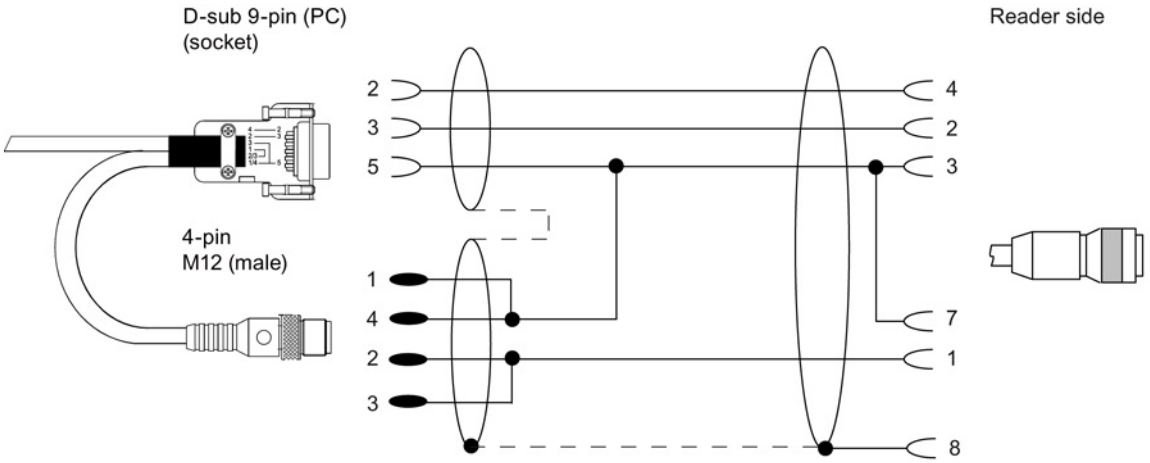


Figure A-4 Connecting cable between PC and RF240R/RF260R/RF290R (RS-232) with 4-pin power supply connector

Suitable power supply unit: e.g. wide-range power supply unit

With open ends for the power supply

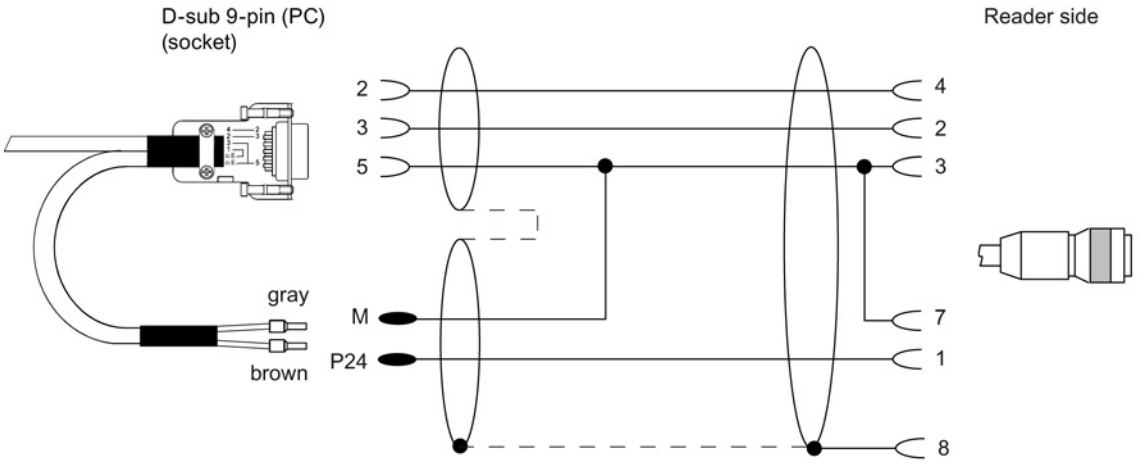


Figure A-5 Connecting cable between PC and RF240R/RF260R/RF290R (RS-232) with open ends for the power supply

Table A- 4 Ordering data connecting cable

	Order number
Connecting cable RS-232 with M12 male connector (4-pin), 5 m	6GT2891-4KH50
Connecting cable RS-232 with open ends (5 m)	6GT2891-4KH50-0AX0

A.3 Ordering data

RF200 components

Table A- 5 RF200 reader

Readers	Description	Article number
RF210R	• With RS422 interface (3964R) • IP67 • Operating temperature: -25 °C ... +70 °C • Dimensions (L x Ø): 83 x 18 mm • with integrated antenna	6GT2821-1AC10
RF220R	• With RS422 interface (3964R) • IP67 • Operating temperature: -25 °C ... +70 °C • Dimensions (L x Ø): 83 x 30 mm • with integrated antenna	6GT2821-2AC10
RF240R	• With RS422 interface (3964R) • IP67 • Operating temperature: -20 °C ... +70 °C • Dimensions (L x W x H): 50 x 50 x 30 mm • with integrated antenna	6GT2821-4AC10
RF240R	• With RS-232 interface (3964R) • IP67 • Operating temperature: -20 °C ... +70 °C • Dimensions (L x W x H): 50 x 50 x 30 mm • with integrated antenna	6GT2821-4AC11
RF240R	• With RS-232 interface (ASCII) • IP67 • Operating temperature: -20 °C ... +70 °C • Dimensions (L x W x H): 50 x 50 x 30 mm • with integrated antenna	6GT2821-4AC40
RF250R	• With RS422 interface (3964R) • IP67 • Operating temperature: -20 °C ... +70 °C • Dimensions (L x W x H): 50 x 50 x 30 mm • Reader with connections for external antennas ANT 8, ANT 12, ANT 18, ANT 30	6GT2821-5AC10

Readers	Description	Article number
RF250R	• With RS-232 interface (ASCII) • IP67 • Operating temperature: -20 °C ... +70 °C • Dimensions (L x W x H): 50 x 50 x 30 mm • Reader with connections for external antennas ANT 8, ANT 12, ANT 18, ANT 30	6GT2821-5AC40
RF260R	• With RS422 interface (3964R) • IP67 • Operating temperature: -20 °C ... +70 °C • Dimensions (L x W x H): 75 x 75 x 41 mm • with integrated antenna	6GT2821-6AC10
RF260R	• With RS-232 interface (3964R) • IP67 • Operating temperature: -20 °C ... +70 °C • Dimensions (L x W x H): 75 x 75 x 41 mm • with integrated antenna	6GT2821-6AC11
RF260R	• With RS-232 interface (ASCII) • IP67 • Operating temperature: -20 °C ... +70 °C • Dimensions (L x W x H): 75 x 75 x 41 mm • with integrated antenna	6GT2821-6AC40
RF290R	• With RS-232 interface and RS-422 interface (3964R) • IP65 • Operating temperature: -20 °C ... +55 °C • Dimensions (L x W x H): 200 x 140 x 80 mm • Long-range reader with the option of connecting external antennas ANT D5, ANT D6, ANT D10	6GT2821-0AC12
RF310M	• IP65 • Operating temperature: -20 °C ... +50 °C • Dimensions (L x W x H): 277 x 100 x 44 mm • Mobile reader with integrated antenna	6GT2803-1AC00
RF310M	• IP65 • Operating temperature: -20 °C ... +50 °C • Dimensions (L x W x H): 277 x 100 x 44 mm • Mobile reader with connections for external antennas ANT 8, ANT 12, ANT 18, ANT 30	6GT2803-1AC10

Table A- 6 ISO transponder

ISO transponder	Description	Article number
MDS D100	• IP68 • Memory size: 112 bytes of EEPROM user memory • Operating temperature range: -25 °C ... +80 °C • Dimensions (L x W x H): 85.6 (±0.2) x 54 (±0.2) x 0.9 (±0.05) mm • ISO card	6GT2600-0AD10
MDS D117	• IP68 • Memory size: Memory size: 112 bytes of EEPROM user memory • Operating temperature range: -25 °C ... +85 °C • Dimensions (Ø x H): 4 x 5 mm	6GT2600-0AG00
MDS D124	• IP67 • Memory size: 112 bytes of EEPROM user memory • Operating temperature range: -25 °C ... +125 °C • Dimensions (Ø x H): 27 (±0.2) x 4 (±0.2) mm	6GT2600-0AC10
MDS D126	• IP68 • Memory size: 112 bytes of EEPROM user memory • Operating temperature range: -25 °C ... +85 °C • Dimensions (Ø x H): 50 x 3.6 mm • Round design with mounting hole	6GT2600-0AE00
MDS D127	• IP68 • Memory size: 112 bytes of EEPROM user memory • Operating temperature range: -25 °C ... +125 °C • Dimensions (Ø x H): M6 x 5 (±0.2) mm	6GT2600-0AF00
MDS D139	• IP68 • Memory size: 112 bytes of EEPROM user memory • Operating temperature range: up to +200 °C/+220 °C [heat-resistant (r/w)] • Dimensions (Ø x H): 85 (±0.5) x 15 (-1.0) mm	6GT2600-0AA10
MDS D160	• IP68 (24 hours, 2 m, +20 °C) • Memory size: 112 bytes of EEPROM user memory • Operating temperature: -25 ℃ ... +70 ℃ • Dimensions (Ø x H): 16 (±0.2) x 3.0 (±0.2) mm • Laundry tag for cyclical applications (r/w)	6GT2600-0AB10
MDS D165	• IP65 • Memory size: 112 bytes of EEPROM user memory • Operating temperature range: -25 °C ... +85 °C • Dimensions (L x W): 86 x 54 mm • Smartlabel (PET) in credit card format	6GT2600-1AB00-0AX0

ISO transponder	Description	Article number
MDS D200	• IP67 • Memory size: 256 bytes of EEPROM • Operating temperature range: -20 °C ... +60 °C • Dimensions (L x W x H): 86 x 54 x 0.8 mm • Credit card format	6GT2600-1AD00-0AX0
MDS D261	• IP65 • Memory size: 256 bytes of EEPROM user memory • Operating temperature range: -25 °C ... +85 °C • Dimensions (L x W): 55 x 55 mm • Smartlabel (PET), small design	6GT2600-1AA01-0AX0
MDS D324	• IP67 • Memory size: 992 bytes of EEPROM user memory • Operating temperature range: -25 °C ... +125 °C • Dimensions (Ø x H): 27 (±0.2) x 4 (±0.2) mm	6GT2600-3AC00
MDS D339	• IP68 • Memory size: 992 bytes of EEPROM user memory • Operating temperature range: -25 °C ... +220 °C • Dimensions (Ø x H): 85 (±0.5) x 15 (-1.0) mm	6GT2600-3AA10
MDS D400	• IP67 • Memory size: 2000 bytes of FRAM user memory • Operating temperature range: -25 ℃ ...+60 ℃ • Dimensions (L x W x H) 85.6 (±0.3) × 54 (±0.2) × 0.8 (±0.05) mm	6GT2600-4AD00
MDS D421	• IP67/x9K • Memory size: 2000 bytes of FRAM user memory • Operating temperature range: -25 ℃ ... +85 ℃ • Dimensions (Ø x H): 10 x 4.5 mm	6GT2600-4AE00
MDS D422	• IP68 • Memory size: 2000 bytes of FRAM user memory • Operating temperature range: -25 ℃ ... +85 ℃ • Dimensions (Ø x H): M20 x 6 (±0.2) mm • Can be screwed into metal (flush-mounted)	6GT2600-4AF00
MDS D423	• IP68 • Memory size: 2000 bytes of FRAM user memory • Operating temperature range: -25 ℃ ... +85 ℃ • Dimensions (Ø x H): 30 (+0.2/-0.5) x 8 (-0.5) mm	6GT2600-4AA00

ISO transponder	Description	Article number
MDS D424	• IP67 • Memory size: 2000 bytes of FRAM user memory • Operating temperature range: -25 °C ... +125 °C • Dimensions (Ø x H): 27 (±0.2) x 4 (±0.2) mm	6GT2600-4AC00
MDS D425	• IP68; IP x9K • Memory size: 2000 bytes of FRAM user memory • Operating temperature range: -25 °C ... +85 °C • Dimensions (Ø x H): 24 X 10 mm; M6 thread • Screw transponder	6GT2600-4AG00
MDS D426	• IP68 • Memory size: 2000 bytes of FRAM user memory • Operating temperature range: -25 °C ... +85 °C • Dimensions (Ø x H): 50 x 3.6 mm • Round design with mounting hole	6GT2600-4AH00
MDS D428	• IP68; IP x9K • Memory size: 2000 bytes of FRAM user memory • Operating temperature range: -25 °C ... +85 °C • Dimensions (Ø x H): 18(±1) x 20(±1) mm (without thread); thread M8	6GT2600-4AK00
MDS D460	• IP68 • Memory size: 2000 bytes of FRAM user memory • Operating temperature range: -25 °C ... +85 °C • Dimensions (Ø x H): 16 (±0.2) x 3.0 (±0.2) mm	6GT2600-4AB00

Table A- 7 Communication modules/interface modules

ASM/ communications module	Description	Article number
ASM 456	ASM 456 for PROFIBUS DP V1 max. 2 readers can be connected	6GT2002-0ED00
ASM 475	ASM 475 for SIMATIC S7 max. 2 x RF2xxR readers with RS-422 can be connected at the same time without front connector	6GT2002-0GA10
RF120C	Communications module RF120C for SIMATIC S7-1200	6GT2002-0LA00
RF160C	Communications module RF160C for PROFIBUS DP V0 max. 2 readers can be connected	6GT2002-0EF00
RF170C	RF170C communications module	6GT2002-0HD00
	RF170C connecting block	6GT2002-1HD00

ASM/ communications module	Description	Article number
RF180C	RF180C communications module max. 2 SLGs or readers can be connected	6GT2002-0JD00
	Connecting block M12, 7/8" (5-pin)	6GT2002-1JD00
	Connecting block M12, 7/8" (4-pin)	6GT2002-4JD00
	Push-pull connecting block, RJ-45	6GT2002-2JD00
RF182C	RF182C communication module Max. 2 SLGs or readers can be connected	6GT2002-0JD10
	Connecting block M12, 7/8" (5-pin)	6GT2002-1JD00
	Connecting block M12, 7/8" (4-pin)	6GT2002-4JD00
	Push-pull connecting block, RJ-45	6GT2002-2JD00
RFID 181EIP	RF182C communications module max. 2 SLGs or readers can be connected	6GT2002-0JD20
	Connecting block M12, 7/8" (5-pin)	6GT2002-1JD00
	Connecting block M12, 7/8" (4-pin)	6GT2002-4JD00
	Push-pull connecting block, RJ-45	6GT2002-2JD00

Table A- 8 Antennas

Antennas	Description	Article number
ANT 8	• IP67 • Operating temperature: -25 °C ... +70 °C • Dimensions (Ø x L): M8 x 40 mm • incl. one antenna connecting cable 3 m	6GT2398-1CF10
	• without antenna connecting cable	6GT2398-1CF00
ANT 12	• IP67 • Operating temperature: -25 °C ... +70 °C • Dimensions (Ø x L): M12 x 40 mm • incl. one antenna connecting cable 3 m	6GT2398-1CC00
ANT 18	• IP67 (front) • Operating temperature: -25 °C ... +70 °C • Dimensions (Ø x L): M18 x 55 mm • incl. one antenna connecting cable 3 m	6GT2398-1CA00
ANT 30	• IP67 • Operating temperature: -25 °C ... +70 °C • Dimensions (Ø x L): M30 x 58 mm • incl. one antenna connecting cable 3 m	6GT2398-1CD00

Antennas	Description	Article number
ANT D5	• IP65 • Operating temperature: -20 °C ... +55 °C • Dimensions (L x W x H): 380 x 380 x 110 mm • incl. one antenna connecting cable 3.3 m	6GT2698-5AA10
ANT D6	• IP65 • Operating temperature: -20 °C ... +55 °C • Dimensions (L x W x H): 580 x 480 x 110 mm • incl. one antenna connecting cable 3.3 m	6GT2698-5AB00
ANT D10	• IP65 • Operating temperature: -20 °C ... +55 °C • Dimensions (L x W x H): 1150 x 365 x 115 mm • incl. one antenna connecting cable 3.3 m	6GT2698-5AF00

Accessories

Table A- 9 Reader accessories

Readers	Accessories	Article number
RF290R	Adapter for mounting on a DIN rail (pack of 3)	6GK5798-8ML00-0AB3

Table A- 10 ISO transponder accessories

Transponder	Accessories	Article number
MDS D100 / D200 / D400	Spacer	6GT2190-0AA00
	Fixing pocket	6GT2190-0AB00
	Securing pocket (cannot be mounted directly on metal)	6GT2390-0AA00
MDS D139 / D339	Spacer (Ø x H): 85 x 30 mm	6GT2690-0AA00
	Quick change holder (Ø x H): 22 x 48 mm	6GT2690-0AH00
MDS D124 / D324 / D424	Spacer (Ø x H): 35 x 15 mm	6GT2690-0AK00
MDS D126 / D426	Spacer (Ø x H): 60 x 30 mm	6GT2690-0AL00
MDS D160 / D460	Spacer (Ø x H): 20 x 15 mm	6GT2690-0AG00

Table A- 11 Antenna accessories

Antennas	Accessories		Article number
ANT 8	Antenna connecting cable with M8 plug (with angled plug)		6GT2391-0AH30
ANT D5 / ANT D6 / ANT D10	Antenna splitter (incl. one antenna connecting cable 3.3 m)		6GT2690-0AC00
	Antenna multiplexer SIMATIC RF260X (incl. one antenna connecting cable 0.4 m)		6GT2894-0EA00
	Antenna cable	3.3 m	6GT2691-0CH33
		10.5 m	6GT2691-0CN10
	Antenna cable extension	7.2 m	6GT2691-0DH72
ANT D6	Cover		6GT2690-0AD00

Table A- 12 Accessories - connecting cable RF200 reader ↔ PC

Connecting cable	Accessories	Article number
RF240R / RF260R / RF290R (RS-232) and PC	Connecting cable RS-232 with M12 male connector (4-pin), 5 m	6GT2891-4KH50
	Connecting cable RS-232 with open ends, 5 m	6GT2891-4KH50-0AX0

Table A- 13 Accessories - connecting cable communications module/ASM ↔ reader

Connecting cables	Description Length	Article number
ASM 456 / RF160C / RF170C / RF180C and RF2xxR reader (RS-422)	2 m	6GT2891-4FH20
	5 m	6GT2891-4FH50
	10 m	6GT2891-4FN10
	20 m	6GT2891-4FN20
	50 m	6GT2891-4FN50
ASM 456 / RF160C / RF170C / RF180C and RF2xxR reader (RS-422) with angled connector	2 m	6GT2891-4JH20
ASM 475 and RF2xxR reader (RS-422)	2 m	6GT2891-4EH20
	5 m	6GT2891-4EH50

Table A- 14 RFID accessories, general

RFID general	Article number
DVD "RFID Systems Software & Documentation"	6GT2080-2AA20
Wide-range power supply unit for SIMATIC RF-systems (100 - 240 VAC / 24 VDC / 3 A) with 2 m connecting cable with country-specific plug	EU: 6GT2898-0AA00 UK: 6GT2898-0AA10 US: 6GT2898-0AA20
24 V connecting cable, 5 m	6GT2491-1HH50

A.4 Service & Support

Technical Support

You can access technical support for all IA/DT projects via the following:

- Phone: + 49 (0) 911 895 7222
- Fax: + 49 (0) 911 895 7223
- E-mail (mailto:support.automation@siemens.com)
- Internet: Web form for Support Request (http://www.siemens.com/automation/support-request)

Contacts

If you have any further questions on the use of our products, please contact one of our representatives at your local Siemens office.

The addresses are found on the following pages:

- On the Internet (http://www.siemens.com/automation/partner)
- In Catalog CA 01
- In the catalog ID 10 specially for Industrial Identification Systems

Service & support for industrial automation and drive technologies

You can find various services on the Support home page (http://www.siemens.com/automation/service&support) of IA/DT on the Internet.

There you will find the following information, for example:

- Our newsletter containing up-to-date information on your products.
- Relevant documentation for your application, which you can access via the search function in "Product Support".
- A forum for global information exchange by users and specialists.
- Your local contact for IA/DT on site.
- Information about on-site service, repairs, and spare parts. Much more can be found under "Our service offer".

SIMATIC documentation on the Internet

A guide to the technical documentation for the various SIMATIC products and systems is available on the Internet:

SIMATIC Guide manuals (http://www.siemens.com/simatic-tech-doku-portal)

RFID homepage

For general information about our identification systems, visit RFID homepage (http://www.siemens.com/ident/rfid).

Online catalog and ordering system

The online catalog and the online ordering system can also be found on the Industry Mall Homepage (http://www.siemens.com/industrymall/en).

Training center

We offer appropriate courses to get you started. Please contact your local training center or the central training center in

D-90327 Nuremberg.

Phone: +49 (0) 180 523 56 11
(€ 0.14 /min. from the German landline network, deviating mobile communications prices are possible)

For information about courses, see the SITRAIN homepage (http://www.sitrain.com).

Glossary

Automation system (AS)

A programmable logical controller (PLC) of the SIMATIC S7 system, comprising a central controller, a CPU and various I/O modules.

Battery-free data storage unit

Mobile data storage units which operate without batteries. Power is supplied to the data storage unit across an electromagnetic alternating field.

Byte

A group of eight bits forms a byte

CE marking

Communauté Européenne (product mark of the European Union)

Communication modules

Communication modules ensure the integration of the MOBY and SIMATIC RF identification systems into SIMATIC, SINUMERIK, SIMOTION, PROFIBUS, PROFINET and TCP/IP. Once supplied with the corresponding parameters and data, they handle data communication. They then make the corresponding results and data available. Corresponding software blocks (FBs/FCs for SIMATIC) guarantee simple and quick integration into the application.

Data transmission rate

Unit of measurement for the volume of data transmitted within a unit of time, e.g. bytes/s

Detection area

Area with minimum field strength containing the transmission window, as well as the areas in which the field strength is no longer sufficient for data exchange.

Dwell time

The dwell time is the time in which the transponder dwells within the transmission window of a read/write device. The read/write device can exchange data with the transponder during this time.

Dynamic mode

In dynamic mode, the data carrier moves past the read/write device at a traversing rate which depends on the configuration. Various checking mechanisms (listen-in check, CRC, ECC, etc.) ensure error-free data transfer even under extreme environmental conditions. A serial connection (up to 1000 m) is used to connect the read/write device directly to an interface module, PC, or any other system.

Electromagnetic compatibility

Electromagnetic compatibility is the ability of an electrical or electronic device to operate satisfactorily in an electromagnetic environment without affecting or interfering with the environment over and above certain limits.

EMC Directive

Guidelines for electromagnetic compatibility This guideline relates to any electrical or electronic equipment, plant or system containing electric or electronic components.

Equipotential bonding

Potential differences between different parts of a plant can arise due to the different design of the plant components and different voltage levels. It is necessary to compensate for these differences by equipotential bonding: this is done by combining the equipotential bonding conductors of power components and non-power components on a centralized equalizing conductor.

ESD Directive

Directive for handling ESDs.

Frequency hopping

Frequency hopping technique Automatic search for free channels.

In frequency hopping, data packets are transferred between the communication partners on constantly changing carrier frequencies. This makes it possible to react to interference from devices transmitting signals in the same frequency range. If an attempt to send a data packet is unsuccessful, the packet can be transmitted again on a different carrier frequency.

Interface modules (ASM)

See communication modules

Limit distance

The limit distance (S_g) is the maximum clear distance between the upper surface of the read/write device and the transponder at which transmission still functions under normal conditions.

L_x

Length of a transmission window in the x direction

L_y

Length of a transmission window in the y direction

M

Centerpoint of a field of a transmission window

Metal-free area

Distance/area which must be maintained between the transponder and metal in order to prevent interference during data transfer between the transponder and read/write device.

Mobile data storage units (MDS)

See transponder

Multi-tag capability

Multi-tag capability means the ability to use several read/write devices which communicate simultaneously with different data carriers.

Programmable logic controller (PLC)

The programmable logic controllers (PLC) of the SIMATIC S5 system consist of a central controller, one or more CPUs, and various other modules (e.g. I/O modules).

Read/write devices (SLG)

See readers

Read/write distance

See transmission distance

Readers

Readers ensure fast, secure data transfer between mobile data storage units and higher-level systems (PLCs, PCs, etc.). The data, energy included, are transmitted inductively across an electromagnetic alternating field or by radio. This principle enables contact-free data transmission, ensures high industrial compatibility and works reliably in the presence of contamination or through non-metallic materials.

RFID systems

SIMATIC RF identification systems control and optimize material flow and production sequences. They identify reliably, quickly and economically, use non-contact data communication technology, and store data directly on the product. They are also resistant to contamination.

S_a

Operating distance between transponder and reader

Secondary fields

The strength of the secondary fields, which exist in addition to the transmission window, is usually lower than that of the transmission window and depends on the metallic environment. Secondary fields should not be used in configuring.

S_g

See limit distance

Static mode

In static mode the transponder is positioned at a fixed distance (maximum: limit distance) exactly above the read/write device.

Tag

See transponder

Telegram cycles

The transfer of a read or write command takes place in three cycles, known as message frame cycles. 1 or 2 bytes of user data can be transferred with each command. The acknowledgement transfer (status or read data) takes place in 3 further cycles.

Transmission distance

Distance between communication module (read/write device) and transponder (mobile data storage unit)

Transmission window

Area in which reliable data exchange between transponder and read/write device is possible due to a particular minimum field strength.

Transponder

An invented word from transmitter and responder. Transponders are used on the product, the product carrier, the object, or its transport or packaging unit, and contain production and manufacturing data, i.e. all application-specific data. They follow the product through assembly lines, transfer and production lines and are used to control material flow.

Because of their wireless design, transponders can be used, if necessary, at individual work locations or manufacturing stations, where their data can be read and updated.

Transponders consist predominantly of logic, FRAM and/or EEPROM.

If a transponder moves into the transmission window of the reader, the necessary power for all of the circuit components is generated and monitored by the power supply unit. The pulse-coded information is prepared in such a way that it can be processed further as pure digital signals. The handling of data, including check routines, is performed by the logic, which also manages the various memories.

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